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ABSTRACT

This report analyzes the course-taking patterns of public high school graduates between 1969 and 1987, based on transcript data from four national studies of high school students: the Educational Testing Service's Study of Academic Prediction and Growth (1969); the National Assessment of Educational Progress (1987); High School and Beyond (1982); and the National Longitudinal Survey--Youth Cohort (1975-82). The study showed that between 1969 and 1987, public high school graduates consistently earned more high school credits on average than had the graduates of prior years. During the 18 years, there have been two distinct trends in course-taking patterns in the academic curriculum. Students tended to earn a relatively high number of academic credits in 1969; the number of credits then declined, to a low in 1979-82, and then began to increase again, reaching the highest level in 1987. The increase since 1979 occurred mostly in mathematics and science courses, whereas foreign languages and social studies declined. Asian student earned more academic credits than any other racial/ethnic group. Participation in the vocational curriculum by high school graduates was almost universal between 1969 and 1987. The average number of credits in vocational education by high school graduates increased rapidly between 1969 and 1975-78, peaked in 1979-82, and then declined slightly through 1987. However, graduates still completed more vocational credits in 1987 than in 1969. (Twenty-six tables, 19 figures, and an appendix containing technical notes are included in this report.) (KC)

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ENROLLMENT TRENDS IN VOCATIONAL AND ACADEMIC EDUCATION IN AMERICAN PUBLIC HIGH SCHOOLS, 1969 TO 1987

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EXECUTIVE SUMMARY

This report analyzes the course-taking patterns of public high school graduates between 1969 and 1987, based on transcript data from four national studies of high school students: the Educational Testing Service's Study of Academic Prediction and Growth (1969), the National Longitudinal Survey of Labor Force Experience—Youth Cohort (1975-78 and 1979-82), High School and Beyond (1982), and the National Assessment of Educational Progress transcript study (1987).

Vocational education has long been recognized as a separate curriculum, providing a different set of course offerings from the academic and general curricula. Because vocational education constitutes a distinct curriculum, it has been customary to assume that there are high school students who can be described as "vocational" students. However, virtually all students participate to some extent in the vocational curriculum, so these broad curriculum, or "track", labels are inaccurate and misleading. Furthermore, they may contribute to the perpetuation of stereotypes that are both damaging to students and result in inappropriate policy responses to perceived educational problems. The curriculum "track" is just too broad to provide detailed insights into students' high school course-taking experiences.

Using transcript data to characterize student participation in vocational education avoids the problems of too high a level of aggregation. Transcripts record each course completed by a student, and this enables researchers and policy-makers to construct accurate representations of course taking and to devise appropriate analyses or policies in response to them. However, transcripts are also cumbersome because of their great detail, and some method of organizing courses must be used to ensure that like courses are categorized in a like fashion.

To ensure comparability across data sets, a taxonomy of secondary courses, developed as part of this research, was applied to each of the transcript files. The Secondary School Taxonomy (SST) organizes the high school courses into three curricula: academic, vocational, personal and other use. Within each part of the curriculum the SST further divided courses according to the type of material taught (i.e., English, mathematics, consumer and homemaking economics, business support, etc.) and, when possible, the level of the material taught (i.e., basic, advanced, or honors).

General Trends in Course-Taking Patterns

Between 1969 and 1987, public high school graduates consistently earned more credits on average than had the graduates of prior years. This pattern was consistent among males and females, students from different racial or ethnic groups, and students with different high school grades. Despite this consistent increase in the average number of credits completed, the total number of credits was composed of different proportions of academic and vocational coursework in the different years. Between 1969 and 1979-82, students completed an increasing proportion of their credits in the vocational curriculum and a declining proportion of their credits in the academic curriculum. Between 1979-82 and 1987, the fraction of credits completed in the academic curriculum increased while the fraction of credits completed in the vocational curriculum decreased.

Certain patterns of participation persisted between 1969 to 1987, even though total credits increased and the distribution of those credits within the different curricula changed over time. Females consistently completed more credits than males, although the difference was small. Similarly, students with higher grades routinely completed more credits than students with lower grades, and students in the Northeast and West completed more credits on average than students in the South and North Central region. Another pattern that did not change was the timing of coursework. Students completed more credits on average in each of their first three years in high school than they completed as seniors.

Trends in Secondary Academic Enrollments

Between 1969 and 1987, there have been two distinct trends in course-taking patterns in the academic curriculum. Students tended to earn a relatively high number of academic credits in 1969; the number of credits earned then declined in the intervening cohorts to a low in 1979-1982, began to increase again in 1982, and was highest in 1987. The courses contributing most heavily to this more recent growth tended to be more advanced or "core" courses. For example, the math courses with the biggest increases in credits earned were geometry and advanced math. (Advanced math includes such courses as Algebra II and III, Trigonometry, and Statistics.) Likewise, in science, biology and chemistry showed the most significant increases in credits earned between 1982 and 1987.

The patterns found in social studies and foreign languages departed from those patterns observed for academic subjects overall. The number of credits earned in social studies and foreign languages in 1987 was less than the number earned in 1969. Fine arts is an exception to the pattern: the lowest number of credits earned was in 1969, increasing in 1975-1978, and then remaining relatively uniform in the remainder of the cohorts.

Changes in the total number of academic credits earned by males and females were similar to the patterns observed for the whole student population. Females, however, tended to earn more academic credits than males, a difference that increased over time. In math and science, where males tended to earn more credits than females in the earlier cohorts, the number of credits earned by males and females converged over time. There were few differences between males and females in the number of credits earned in English and social studies. In fine arts and foreign languages, females consistently earned more credits than males.

There were obvious differences observed in the number of academic credits earned by students from different racial or ethnic groups. Asian students consistently earned more academic credits than any other racial/ethnic group, a difference that increased over time. White students tended to earn more academic credits than black, Hispanic, or Native American students. With the exception of Hispanic students, all students followed the same pattern of change (to different degrees) as the whole population. Unlike the other racial or ethnic groups, the number of credits earned by Hispanic students increased between the 1969 and 1975-1978 cohorts and was lowest in 1982. This decline was then followed by a dramatic increase in credits earned between 1982 and 1987.

Trends in Secondary Vocational Enrollments

Participation in the vocational curriculum by high school graduates was almost universal between 1969 and 1987. Approximately 92 percent of 1969 graduates took some vocational education, but this was the lowest level of participation during the years studied here: between 1975-78 and 1987, at least 97 percent of high school graduates participated in the vocational curriculum.

The average number of credits completed in vocational education by high school graduates increased rapidly between 1969 and 1975-78, peaked in 1979-82, and then declined slightly through 1987. The declines, however, were much smaller than the initial increases, so graduates completed more credits on average in 1987 than they did in 1969. This pattern of rapid increases and then modest declines in vocational participation were reflected in the patterns of participation by students with different characteristics, including sex, parent education, and student grade point average.

The magnitude of these trends, however, differed among various groups of students. For example, the average number of credits taken in vocational education increased more rapidly among males than among females between 1969 and 1979-82, and then declined less severely between 1979-82 and 1987 among males than among females. Hence, females completed more credits on average than males in vocational education in 1969, but by 1987, males completed more credits on average than females.

There was also a clear relationship between grade level and vocational education. Students completed vocational credits in each year enrolled, but the bulk of vocational credits were completed by students when they were juniors and seniors.

Most vocational education was taken in the specific labor market preparation curriculum (SLMP), and this tendency increased over time. The increasing concentration of credits in the SLMP curriculum reflects both absolute increases in courses taken in this curriculum as well as absolute and relative declines in participation in the general labor market preparation curriculum (GLMP). Most of the declines in the GLMP curriculum were in career exploration courses.

Increases in the SLMP curriculum were spread across all fields except business and trades and industry(T&I). Business and T&I enrollments were relatively constant throughout the period and, despite their lack of growth, they were the biggest vocational fields in terms of enrollments in each year between 1969 and 1987. The most pronounced growth in enrollments was in technical and communications fields, which includes all computer-related programs.

Most growth within the SLMP curriculum was at the level of the first course in a sequence. However, this growth did not seem to result in absolute declines in the number of credits completed in the more advanced level courses, that is, the second or later course in a sequence. In general, increases at the first course level seemed to replace specialty courses. When we examined the depth of course-taking experiences in the students' primary vocational field, we found that the degree of concentration in vocational course-taking increased slightly between 1969 and 1987.

Access to Secondary Vocational Education

The Carl D. Perkins Act seeks to increase greater access to vocational education for students with a handicapping condition, students who are economically or educationally disadvantaged, and students pursuing vocational training in non-traditional occupations. If the number of credits earned indicates access at the secondary level, then the results of this study are promising.

For this research, father's education and high school grades were used as indicators of economic and academic disadvantages. Students who had relatively lower grades, mostly C's or below, enrolled in vocational education at rates equal to or greater than the overall student population. Similarly, students whose fathers had not completed any postsecondary education enrolled in vocational education at rates equal to or greater than the overall student population. Compared to non-disadvantaged students, disadvantaged students also completed a larger proportion of their high school coursework in the vocational curriculum. These differences held true throughout the period considered in this report, 1969 to 1987.

In the class of 1987, handicapped students completed more vocational coursework than non-handicapped students. Furthermore, handicapped students completed a proportionately larger fraction of their coursework in vocational education than non-handicapped students. With the exception of typing, this was true throughout the general labor market curriculum. Similarly, it was also true in most parts of the specific labor market curriculum.

The findings on enrollments for males and females in non-traditional occupations are less positive. By 1987 males and females participated at the same rates in business management, marketing, and distribution, and technical and communications courses. However, males continued to dominate in fields considered traditionally male. Females earned almost no credits in either construction, mechanics, or agriculture. Similarly, males were still underrepresented in vocational fields considered traditionally female.

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Although many have contributed to this project, final responsibility for the content and accuracy of this report belongs to the authors.

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CHAPTER I

INTRODUCTION

This report analyzes the participation of public high school students in vocational education between 1969 and 1987, based on transcript data from four national studies of high school students. Using a taxonomy of courses that we developed earlier for analyzing transcript data for the 1980 sophomore cohort from High School and Beyond (HS&B), this study applies that methodology to three other transcript studies to develop time series data that present a picture of how course-taking patterns have changed over time.[1] While the study focuses on vocational education, it also examines academic course-taking patterns so that the interaction between participation in the academic and vocational curricula may be better understood.

Vocational education in American high schools has long been recognized as a distinct curriculum, providing a different set of course offerings from the academic and general curricula. While the boundaries between the vocational and non-vocational curricula sometimes blur—precisely where such courses as Business Math, Business English, Typing I, or Computer Science belong is debatable—vocational education has clearly established itself as a discipline unto itself.

Because vocational education constitutes a distinct curriculum, it has been customary to assume that there are high school students who, for whatever reasons, can be described as "vocational" students. Indeed, the culture of most American high schools encourages students to identify themselves as either academic, general, or vocational. Aside from perpetuating an insidious high school caste system, otherwise known as tracking, it is by no means clear what purpose such labels serve. Interestingly, there is no clear definition of precisely how one comes to be labeled academic, general, or vocational, and, as we will demonstrate below, any such definition is certain to be arbitrary.

In this study we have consciously avoided trying to define or count "vocational students." We learned early on that virtually all high school students, 98 percent of the class of 1987, participated in vocational education at some time during their high school careers.

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[1] See E. Gareth Hoachlander, Cynthia Brown, and John Tuma, *Measuring High School Curricular Experiences: Implications for Vocational Education*, a report prepared for the National Assessment of Vocational Education, U.S. Department of Education, December 1987.

Clearly, if mere participation defines a student as vocational, then nearly all high school students have been vocational students. One could, of course, try to define a student as vocational if he or she completed vocational education credits in excess of some specified number in either vocational education generally or in a particular vocational sub-field. However, we could think of no theoretical or empirical justification for determining what this number of credits might be. More to the point, why was such a number necessary? Would it not be more informative to describe the broad continuum of participation in the vocational education curriculum and analyze how course-taking patterns vary among different types of students?

Resisting the temptation to identify vocational students and instead concentrating on the extent to which *all* students use the vocational education curriculum may have other advantages. For one, it may help to reduce some of the more negative stereotypes that have grown up around vocational education and the students who participate in it. It is commonly believed, for example, that vocational education is for the "non-college bound." While it is true that many students taking vocational education courses do not go on to college, it is also true that many do, even students who take a lot of vocational education. Equally important, just as the non-college bound can benefit from much of what is offered through the academic curriculum, the college-bound can also benefit from vocational education offerings. By perpetuating the notion that the academic and vocational curricula are intended for very different types of students with very different learning objectives, we may miss opportunities to exploit what each curriculum has to offer all students, albeit in varying amounts and in different subject areas.

This potential for ignoring the potential contributions of vocational education is already evident in the recent wave of educational reform that has swept through the nation. Most reform efforts to date have focused almost entirely on improving basic (i.e., academic) education, resulting in increased high school graduation requirements in districts across the country. This emphasis on "basic" education has largely ignored the contribution of vocational education as an alternative means for imparting theoretical principles and academic concepts through practical applications. Different students learn in different ways and at different rates, and by limiting choices to the conventional academic paradigm, those who learn more slowly, or learn better through experience rather than dealing with abstractions, may be denied more effective means to learn.

The central issue that has been overlooked in the recent education reform movement is that vocational education has much to offer not only the high school student who plans to go to work immediately following high school graduation but also the student who plans to pursue postsecondary education or training. A well-conceived automotive or aeronautical vocational program, for example, can promote a very sophisticated understanding of physics that will stand a student well in the most rigorous pursuit of four-year college training, while also serving the more immediate needs of a student seeking employment in automotive or aeronautic fields immediately after high school. However, if *a priori*, it is assumed that only the latter student should consider taking a course in vocational education, we may be making serious mistakes.

How high school course-taking patterns have been affected by the recent education reform efforts is a major objective of this study. There have been many anecdotal reports from around the country that the increases in graduation requirements have caused enrollment in vocational education courses to decline. To date, however, there has been little hard evidence to support these claims. By comparing the transcripts of students who were high school seniors in 1982 (pre-reform) with those of students who graduated in 1987 (post-reform), this study provides the first national snapshot of the effects of education reform on secondary vocational education. Additionally, it provides a longer range comparison with the course-taking patterns that existed in 1969 and throughout the 1970s.

Using transcripts to describe enrollment patterns is a rather recent development, and the remainder of this chapter explains the advantages of transcripts over other approaches to collecting enrollment information. It also briefly describes the four data sets that are the basis for the study. Chapter Two provides a broad overview of the general trends in high school enrollments from 1969 to 1987. Chapter Three examines trends in enrollments in the academic curriculum. Chapter Four describes participation trends in the vocational education curriculum, and Chapter Five analyzes changes in access to vocational education for students with special needs.

Advantages of High School Transcripts for Evaluating Participation in Vocational Education

The need for accurate and useful data to evaluate federal objectives in vocational education led Congress to establish the Vocational Education Data System (VEDS) during the reauthorization of the Vocational Education Act in 1976. VEDS was to be designed to collect enrollment and expenditure data on secondary vocational education. However, Congress did not specify the data to be collected, their level of aggregation, or the frequency of data collection. The 1976 Amendments did articulate formulas for the distribution of vocational education monies, and from these formulas one could conclude that certain elements would have to be reported, but aside from such inferences, the National Center for Education Statistics was left on its own to develop VEDS.

VEDS sought to report enrollment data at the program level, enrollments of specific population subgroups such as disadvantaged and handicapped students, and data on the spending of federal vocational education monies. However, unlike the data sets used here, which are samples of students, the VEDS was a census of vocational enrollments and of expenditures on vocational education. To collect these census data, classroom teachers, counselors, and school administrators were all asked to fill out numerous forms, which were then collated and aggregated at the state level. State level data were then reported to the federal government. However, VEDS did not produce accurate data, and the combined expenditures of local, state, and federal agencies on these data were enormous.[2]

The use of high school transcripts to assess student participation in the academic and vocational curricula represents a different approach to meeting the data needs of Congress and others concerned with vocational education policy. VEDS was a census, which attempted to collect data on every student participating in vocational education. The transcript data used here were derived from samples of students that were scientifically designed to provide accurate estimates of the national population of high school students. Sampling methods are much less costly than census collection efforts, and the smaller size of the data collection effort also gives researchers much greater control over the quality of the data being collected. Because of the relatively low costs and the greater quality control offered by sampling techniques, carefully designed samples can actually provide greater detail than census collections. Furthermore, with large samples, sampling provides statistical estimates that are very accurate and reliable.

In contrast to earlier data collection efforts, which were unreliable over time and across data sets, we were able to use four different data sets—which had been collected at different times and by different organizations—to estimate patterns of enrollment from 1969 to 1987, and the results show a remarkable consistency over the years. This consistency is largely attributable to two things: the first is the relatively disaggregated level at which the data were reported (individual courses for individual students), and the second is the consistent framework for organizing this information, the Secondary School Taxonomy. These technical advances provide for the first time a reliable source of enrollment information that can be used for evaluating the success of federal policy objectives in vocational education.[3]

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[2] For a detailed discussion of the problems that have plagued the collection of accurate data on vocational education, see E. Gareth Hoachlander, *National Data Needs for Vocational Education*, Berkeley, California: National Center for Research in Vocational Education, University of California, January 1989.

There are three basic measures of high school students' course-taking experiences. The simplest and most highly aggregated measure is the student's high school curriculum track (academic, vocational, or general). A less aggregated, and therefore more informative, measure of a student's high school course-taking experiences is provided by partial course-taking information such as the number of courses a student completed in mathematics, English, or business. A third measure of courses completed is the student's high school transcript.

The high school curriculum track is too broad to be useful in formulating policy or evaluating participation in the high school curriculum. The measure of partial course-taking is better, but it suffers from problems of consistency. For example, two students may take vocational mathematics, but one might include this in a count of vocational courses taken, the other in a count of mathematics courses taken. Since students, or whoever is reporting the number of courses, do not necessarily classify courses in a similar fashion, there is no way that one can discern whether differences in patterns of course taking from one year to the next, or even from one school to the next, reflect real differences in the distribution of credits or differences in the classification scheme.

Transcripts provide a complete record of the courses taken by students in high school. Researchers and policy makers are therefore able to examine in detail the substantial variations in patterns of participation within curriculum tracks, as well as the entire record of courses, rather than just a partial summarization. Transcript data also make possible a relatively consistent scheme for classifying courses so that any changes in patterns of participation in the high school curriculum over time can be documented.

One advantage of using transcript data is their detail. Transcripts provide a course-by-course listing of the courses taken by students while they were in high school. Hence questions about the relationships between courses or parts of the curriculum can be addressed. In contrast, the curriculum track measure does not allow any real disaggregation of the courses completed by students in high school. The level of aggregation may have important policy implications. For example, students enrolled in the vocational track may have poorer job precise placement of courses in the taxonomy.[4] However, this level of differentiation was not consistent across all of the data sets. Several NLS-Youth course titles were often aggregated as a single course code; in several cases these multiple course titles were distinguished separately in HS&B and were placed in different parts of the taxonomy. As a result, there were a number of inconsistencies in the time-series data that are not indicative of different patterns of course-taking, but are a function of inconsistencies in the way courses were coded in the original transcript data sets.

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[3] Transcript data cannot be used to assess expenditures on vocational education or post-training employment, since transcripts are designed primarily to record a student's high school record. However, different data, such as expenditures per student or employment data could conceivably be collected through sampling techniques in order to complete an assessment of the effectiveness of various policy instruments in achieving federal goals in vocational education.

Even though multiple titles were not combined in several of these data sets, a single course title in the transcript files contains information that is an aggregation of courses from different school. Even courses with relatively clearly defined subject matter such as Algebra 1 may differ somewhat from school to school in terms of specific content, methodology, or level of sophistication. Thus, even at this level of detail, each course title represents an "average" course with generally the same content, rather than a course with very specific, clearly defined content. By focusing on the course as the unit of aggregation, however, the amount of variation represented by each taxonomic category is relatively small. For example, within the vocational curriculum track, students can complete credits in such diverse areas as auto shop or health occupations; within a student-reported measure of semesters completed in science, they would include physics and biology; at the level of the taxonomic categories in the SST, which are based on aggregations of specific courses, we can determine how many credits students earned in health or biology. There may be questions still about the amount of variation in courses labeled Biology 1 that we cannot resolve, but the level of indeterminacy is small relative to the broader track measure.

Data Sets and the Sample of High School Graduates

Four data sets were used to generate the statistics in this report. These were the Educational Testing Service Study of Academic Prediction and Growth (1969), the National Longitudinal Survey of Labor Force Experiences—Youth Cohort (1975-78, 1979-82), High School and Beyond (1982), and the National Assessment of Educational Progress (1987). Graduation years are shown in parentheses. NLS-Youth data were first collected in 1979, but the students represented in the data set graduated from high school between 1971 and 1984.

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[4] The SST was first developed using the High School and Beyond data set. The original SST was developed for the National Assessment by Cynthia L. Brown, E. Gareth Hoachlander, and Robert H. Meyer, with the assistance of National Assessment Staff, staff of the NAVE Support Center (VESAC), and an external review panel. Subsequent versions of the SST for the other data sets were developed by Antoinette Gifford, John Tuma, and Robert H. Meyer. These taxonomies will be published separately as a report of the National Assessment.

Because of the small size of the annual number of graduates, we aggregated several years to ensure accurate statistics.

The statistics presented in this report are estimates of the course-taking experiences of high school graduates only. Each data set included a slightly different sample of students, so it was necessary to develop an algorithm for each data set that produced a comparable sample of students. Although the specifics differed somewhat, the general rules for inclusion in the sample of high school graduates were the same for each data set: students had to be identified as high school graduates, transfers, or as unknowns. Students explicitly identified as dropouts, as still enrolled, as recipients of special education diplomas, or as GED recipients were excluded from further consideration. In addition, the students had to have completed between 16 and 32 credits in high school (in order to avoid contaminating the sample with incomplete transcripts), and they had to have completed more than zero English credits during high school. Complete decision rules for each data set are shown in the technical appendix to this report.

In general, the statistics presented here reflect the course-taking patterns of the average high school graduate. There really is no such thing as an average graduate (with, say, 4.44 credits in vocational education), but it is a useful fiction, since the average student reflects the major point of comparison between years. The average number of credits completed generally reflects two different measures of participation in the high school curriculum: the intensity of participation (that is, the number of credits completed) and the percentage of students participating. Since the averages are calculated using all graduates as the denominator, both measures are reflected. In several instances the average number of credits shown reflects the credits earned divided by only those graduates who actually earned credits in the specific curricular area. These instances are clearly labeled in this report.

In addition to the general statistics reflecting the whole population, many of the statistics reflect participation by students with various characteristics. For example, sex, race and ethnicity, parents' education, students' high school grade average, and grade level (the year in which the course was taken). Unfortunately, the data sets did not all contain measures of family income, so parents' education, which is highly correlated with family income, has been used as a proxy measure.[5] The positive correlation between family income and parent education exists for both parents; we have used father's education in this report rather than include both mother's and father's education in order to reduce the number of variables analyzed.

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[5] High School and Beyond data show that students from families with less than $12,000 annual income in 1980 were much more likely to have parents that had no more than a high school education than were students from families with more than $25,000 annual income. Alternatively, those students from families with more than $25,000 annual income in 1980 were much more likely to have parents with a BA or higher than students from families with less than $12,000 annual income. See Eva Eagle, *High School and Beyond: Socio-economic Status and Home Environment: the Correlates of Student Achievement*, a report prepared for the National Center for Education Statistics, U.S. Department of Education (Berkeley, CA: MPR Associates, Inc.), Table 3.

Several of these variables—sex, high school GPA, and father's education—are particularly important for evaluating federal objectives in vocational education. Sex is used to assess whether students are enrolling in non-traditional occupations or whether there continues to be a gender stereotype in vocational enrollments. High school GPA is a proxy for educational disadvantages, and father's education is a proxy for economic disadvantages. These are all categories of students that are specifically addressed in the Perkins Act as student populations with special educational needs. Chapter V, Access to Secondary Vocational Education, addresses issues of access with respect to students with special educational needs. In addition to these student characteristics, Chapter V also examines the enrollment of handicapped students in vocational education in 1987, the only year for which reliable data on student handicaps were available.

The data sets did not record all of the variables in the same way. For example, the race/ethnicity variable was coded differently in three of the four data sets. Table I.1 shows how each data set recorded this variable. Only blacks and Hispanics were recorded separately in each data set. Whites were recorded separately in the Educational Testing Service Study of Academic Prediction and Growth (ETS), High School and Beyond (HS&B), and the National Assessment of Educational Progress (NAEP), but they were aggregated with all non-blacks

Table I.1
Race/Ethnicity in Each of the Data Sets

ETS (1969)	NLSY (1975-82)	HS&B (1982)	NAEP (1987)
Asian	–	Asian	Asian
Black	Black	Black	Black
Hispanic	Hispanic	Hispanic	Hispanic
–	–	Native Amer.	Native Amer.
White	Non-black/Non-Hispanic*	White	White
Other	–	–	–

* Includes Asians, Native Americans, and others

and non-Hispanics in the National Longitudinal Survey of Labor Force Experiences—Youth Cohort (NLS-Youth) data set. However, since whites composed the overwhelming majority of students in this category, one is probably safe in making generalizations as if this group included only whites. Native Americans were included separately only in HS&B and NAEP. These inconsistencies make direct comparisons difficult, although not impossible. The reader should be aware of the limits of the data in each case, since our interpretation of the findings reflects these limitations.

In contrast to the row variables, which were taken from student or school reported information in the data files, the enrollment statistics and the grade level variable (used as a row variable in the tables) were calculated from transcripts. These statistics were calculated in the same way for each data set, so they are comparable from one data set to the next.

CHAPTER II

GENERAL TRENDS IN PUBLIC HIGH SCHOOL ENROLLMENT

Between 1969 and 1987, the average number of credits completed by the graduates of American public high schools increased from 20.46 to 22.77. Most of this growth in total credits occurred between 1982 and 1987. However, while total credits continuously increased from one year to the next, the distribution of those credits within the academic, vocational, and personal use curricula shifted over time. With respect to the distribution of credits across the different curricula, the period 1969 to 1987 can be neatly broken into two periods in which the general trends move in opposite directions. Between 1969 and 1979-82 the trend in patterns of course taking by public high school graduates was toward relatively lesser participation in the academic curriculum and relatively greater participation in the vocational curriculum. Between 1979-82 and 1987 the trend goes the other way: toward relatively more academic education and relatively less vocational education.[6]

These opposite trends reflect two distinct periods in American education. The first period, 1969 to 1979-82, was one of increasing liberalization within the high school curriculum, during which students gained greater say over what they would study. It was a period during which many of the assumptions about education—both content and delivery—were being questioned. Pluralism and choice gained greater currency, and students were afforded greater latitude to determine the content of their curriculum.[7] Between 1969 and 1982 there was a corresponding diffusion in the high school curriculum, particularly in English and social studies. In English, more students took courses in such areas as literature and composition, rather than in basic English; in social studies, the average number of credits completed in world history and American government declined, while there were large increases in social science, a diffuse taxonomy category that includes everything from area studies to economics to psychology.[8] During this period, students completed an increasing percentage of their total credits within the vocational curriculum, with most of the growth in vocational course taking coming between 1969 and 1975.

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[6] The years for which we have transcript data is an idiosyncratic result: we took advantage of the years for which data were available. Furthermore, because of the small sample size of the NLS-Youth data set, several years had to be aggregated in order to produce reliable statistics. These aggregations are unfortunate because the data seem to suggest that increases in academic course taking and declines in vocational course taking started to occur before 1982, and perhaps as early as 1979 or 1980. Nonetheless, we do not have individual data points for these years, so changes in the general trends are traced back to 1979-82.

[7] An interesting essay on the effects of liberalization and choice is Aurthur G. Powell, Eleanor Farrar, and David K. Cohen, *The Shopping Mall High School: Winners and Losers in the Educational Marketplace*, (Houghton Mifflin: Boston, 1985).

[8] For more on diffusion within the high school curriculum, see Clifford Adelman, *Devaluation, Diffusion, and the College Connection, A Study of High School Transcripts, 1964-1981*, a report prepared for the National

The second period, 1979-82 to 1987, was a period of increasing consolidation within the high school curriculum. High schools continued to offer an enormous variety of courses, but students seem to have concentrated their course taking in more traditional academic courses. This trend appears to have started sometime between 1979 and 1982 (well before *A Nation at Risk*, which was released in April 1983), but the real growth in academic course taking occurred after 1982. These changes may reflect the increase in many states' graduation requirements, they could reflect students' perceptions of changing demands for college entrance or employment, or some combination of factors, but there can be no doubt that the trend toward academic education was as strong as the earlier trend toward vocational education.

These trends, first toward greater flexibility and then back toward greater emphasis on the academic basics, are part of a long history of cyclical development within the American high school curriculum. According to Copa, a review of trends in the high school curriculum over time

> showed the movement from the stern learning environment of the early schools to the progressive movement of the '20s and '30s, to a return to mental discipline [in] the '40s, to "new" mathematics and physics in the '50s and '60s, to attempts to humanize and "open" the schools in the '70s, to higher expectations and rigor today.[9]

Hence, the opposite trends exhibited in patterns of course taking between 1969 and 1987 are part of an on-going effort to find the right balance between academic rigor and educational exploration. The right balance between the two probably changes as the demands placed on the schools by society change. The current emphasis in education is "academic excellence," but in the earlier period the emphasis was on exploration, inclusion, and social integration. With limited resources, the schools cannot maximize all ends simultaneously, so efforts to strike the right balance will continue.

The current emphasis in the high schools is academic excellence, and the general trends in the curriculum reflect this goal. However, this emphasis has not resulted in substantial declines in participation in the vocational curriculum. Even with the efforts to encourage students to take

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Commission on Excellence in Education (National Institute of Education, March 1983). According to Adelman, the increasing diffusion within the high school curriculum parallels trends in the college curriculum, and, in fact, was influenced by the liberal curriculum model that had been adopted in many colleges.

[9] Copa and Johnson, *Vocational Education and High School Graduation Requirements*, (St. Paul, Minnesota: Minnesota Research and Development Center for Vocational Education, University of Minnesota, 1988), 11.

more math, science, and English, the average student continues to take vocational education. Within the limited number of credits each student can earn before leaving high school, there is a tendency to integrate courses from the different curricula. The traditional means of characterizing the high school curriculum as academic or vocational does not really reflect patterns of course-taking by high school students. Vocational education continues to be an important part of the high school student's educational experience, and concern about academic excellence should not obscure this fact.

The three curricula—academic, vocational, and personal use—offer very different learning experiences. Hence, the substantial amount of integration among them within individual student's course-taking experiences should not be surprising. The academic curriculum is composed of mathematics, science, English, social studies, fine arts, and foreign languages. The vocational curriculum contains courses in general labor market skills (such as typing), employability skills and work experience, consumer and homemaking economics, and specific vocational fields (such as business or trades and industry). The personal use curriculum includes such courses as student government, religion, community involvement, and physical education. Each of these different learning experiences is represented to some extent in almost all students' high school experiences.[10]

General Trends in the Academic Curriculum

Over time, the average number of credits completed by public high school graduates consistently increased. Graduates completed an average of 20.46 credits in 1969, and by 1987, they completed an average of 22.77 credits.[11] However, Figure II.1 shows the average number of credits completed rose slowly between 1969 and 1982, increasing from 20.46 to 21.44 credits over that period; since 1982, the average number of credits has increased more rapidly from 21.44 to 22.77 in 1987.[12]

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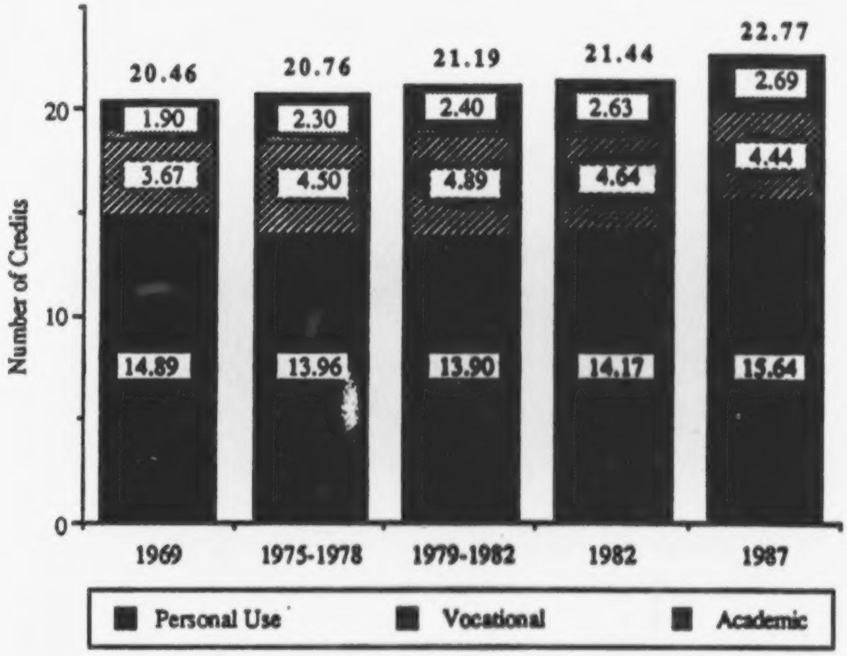
[10] For a more elaborate description of the different curriculums, see Gifford, Hoachlander, and Tuma, *The Secondary School Taxonomy Report*, prepared for the National Assessment of Vocational Education (Washington, D.C.: Office of Planning, Budgeting, and Evaluation, U.S. Department of Education). Publication Pending.

[11] Credits are measured in Carnegie units. One credit, or Carnegie unit, is the equivalent of a one-period course that runs the full length of the academic year. Courses taken by students in high schools that were not on the semester system or that offered other non-standard length courses were adjusted to reflect the standardized Carnegie unit.

[12] The rapid increase in credits is very striking after the relatively long period of stability in the total number of credits completed, and initially suggested that perhaps there was some difference in the way credits had been coded in the original data. However, a study conducted in California on the effects of school reform using master course lists and data from the California Basic Education Data System indicated increases of equal magnitude.

Figure II.1
Average Credits Completed in High School, 1969 to 1987[13]



Both the general stability in the average total credits completed by high school graduates between 1969 and 1982, and the relatively dramatic increase in the average number of credits completed between 1982 and 1987 reflect the pervasiveness of graduation requirements and their similarities in the different states. Most states set minimum graduation requirements (although in some states local school boards are authorized to set these standards), and despite the lack of national graduation requirements, most states have established similar levels of achievement for graduation. Not only have the states been active in setting minimum requirements for many years, but they have also been fairly uniform in the recent pursuit of higher graduation requirements. Between 1980 and 1987, at least 33 states increased their standard graduation requirements, and at least six states increased requirements between 1985 and 1987.[14] This uniformity is somewhat surprising since the federal government does not mandate national graduation requirements; however, as the description by Copa suggests, the

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See Pamela L. Grossman, Michael W. Kirst, and Jackie Schmidt-Posner, "On the Trail of the Omnibeast: Evaluating Omnibus Education Reforms in the 1980s," *Education Evaluation and Policy Analysis* 8 no.3 (1986): 253-266.

[13] These totals do not coincide exactly with the totals in Table II.2 due to rounding and to the inclusion of special education credits in Table II.2. Special education credits did not amount to more than 0.02 credits on average in any one year, so they were excluded from this graphic.

[14] *Clearinghouse Notes*, Education Commission of the States (Denver, Colorado, September 1987).

states do seem to act in concert, responding to the same national concerns and pursuing similar social goals.

The majority of credits completed by public high school graduates has consistently been in the academic curriculum. The average number of academic credits completed by high school graduates declined slightly between 1969 and 1975, from 14.89 to 13.96, and then held steady at about 14 credits through 1982. However, between 1982 and 1987, the average number of academic credits completed by high school graduates increased by almost two credits, from 14.17 to 15.64—the equivalent of one and one-half full-year, one-period courses.

Increases in the average number of credits completed by high school graduates in the academic curriculum accounted for all of the increase in the total average number of credits completed in high school between 1982 and 1987. Again, this is largely a reflection of the increases in the graduation requirements for a standard diploma. Among the 33 states that raised graduation requirements between 1980 and 1987, almost all increased the number of credits in English, mathematics, and social studies that are necessary to obtain a standard diploma.

Between 1982 and 1987, increases in the overall number of credits completed by public high school graduates were the result of increases in the academic curriculum; in contrast, increases in overall credits completed between 1969 and 1982 were due to increases in the number of credits taken in the vocational and personal use curricula. In fact, increases in the number of credits completed in the vocational and personal use curricula were enough to offset slight declines in the average number of academic credits completed by high school graduates between 1969 and 1979-82.

After 1969, the average number of vocational credits completed by high school graduates increased from 3.67 to 4.89, peaking sometime between 1979 and 1982. Between 1979-82 and 1987, however, average vocational credits declined slightly, from 4.89 to 4.44. This is a small, albeit statistically significant, decline in the average number of vocational credits completed by high school graduates, but the smallness of the decline illustrates that students, at least those who graduated, were willing to increase the total number of courses they completed rather than give up their vocational electives.[15]

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[15] Part of the story in explaining the small decline in vocational education is that while academic graduation requirements were being increased, so too were the total number of credits required for graduation. Hence, students not only had to increase their academic course-taking, but their overall course taking as well. But this

This finding should be encouraging to vocational educators, many of whom expressed concern that increased academic graduation requirements would lead to the demise of the vocational enterprise. After years of declining enrollments due to declines in the size of the high-school age population, these educators feared that increasing academic graduation requirements would be the last straw. While too early to say conclusively, the educational reform movement does not seem to have compelled students to drop vocational electives.

Like participation in the vocational curriculum, the participation by public high school graduates in the personal use curriculum increased after 1969. The average number of personal use credits completed was 1.90 in 1969, and by 1982 this had increased to 2.63 credits. Participation in the personal use curriculum was steady between 1982 and 1987.

Participation in the Various Curricula as a Percentage of Total Course Taking

The absolute number of credits completed in each of the various curricula is one way to illustrate trends in student participation in the high school curriculum. Another way is to look at the distribution of credits from each of the curricula within the total number of credits. The absolute measure indicates how many credits were taken—the absolute level of participation; the relative measure shows how students chose to allocate their limited time while in high school to different educational pursuits.

The percentage of credits accounted for by courses in each of the three curricula, like absolute numbers of credits completed in each of the curricula, changed incrementally over time. Furthermore, the relative distribution of credits exhibited the same patterns as the absolute numbers of credits (Figure II.2). Academic credits as a percentage of the total were highest in 1969, at 72.7 percent. The average percentage of credits taken in the academic curriculum declined to a low of 65.6 percent between 1979 and 1982, but by 1987, academic credits accounted for 68.7 percent of the total. In contrast, vocational credits as a fraction of total credits were lowest in 1969—17.9 percent—but between 1979 and 1982, vocational credits accounted for almost one-fourth of the total —23.1 percent. By 1987, the fraction of courses taken by graduates in vocational education had declined to 19.5 percent of all credits. Personal use credits, after a slight increase between 1969 and 1975-78 from 9.3 percent to 11.1 percent of the total, were quite stable over time, fluctuating between 11 and 12 percent of total courses taken.

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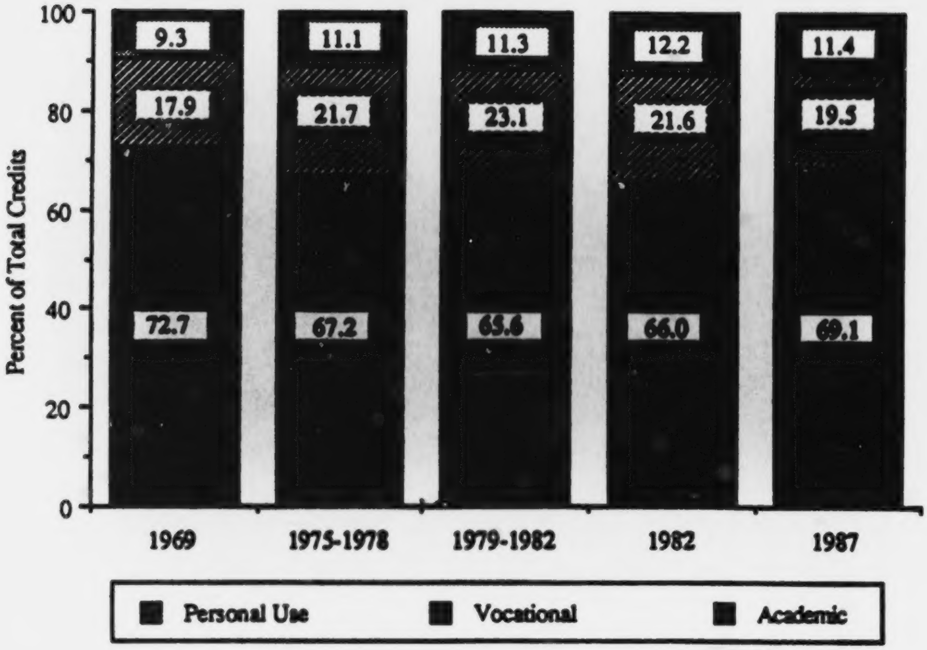
explanation overlooks the fact that most states require between 16 and 21 credits for graduation, considerably fewer than high school graduates are currently taking on average.

Figure II.2
Percentage of Credits Taken in Each Curriculum



When viewed in this way, there appears to be a tradeoff between participation in the academic and vocational curricula. Within the total number of credits a high school student can earn, the student must choose between participating in the academic, vocational, or personal use curricula. Thus, while increases in the number of academic credits completed by public high school graduates do not appear to be at the expense of maintaining absolute participation in the vocational curriculum, they do appear to come at the expense of relative participation in the vocational curriculum.

Percentage of Students Participating in the Different Curricula

The average number of credits earned in the various curricula reflect two measures of participation: the fraction of students participating and the intensity of their participation. Since the average number of credits earned is taken over the whole population of high school graduates whether or not they took courses from each of the curricula, the average credits earned summarizes the effects of both measures of participation. Thus, the "average" student in 1969 completed 3.67 credits in vocational education. However, among the 92 percent of high school students who participated in the vocational curriculum, each participant earned an average of 3.99 vocational credits.[16]

All public high school graduates participated in the academic curriculum, so the average number of academic credits completed does not change. In contrast, somewhat less than 100 percent of all students participated in the vocational and personal use curricula, although participation was almost universal. Ninety-two percent of all public high school graduates participated in the vocational curriculum in 1969, and the level of participation increased to 98 percent by 1979-82; participation in the vocational curriculum persisted at about 98 percent between 1979-82 and 1987. Table II.1 shows the rates of participation in vocational education and the average number of credits earned by those participating. Because a smaller fraction of graduates were enrolled in vocational courses in 1969 than in other years, the diluting effect of averaging credits over the whole population was greater in 1969 than in other years. Thus, while the average number of vocational credits taken by participants did increase between 1969 and 1979-82, the increase was approximately 1 credit (3.99 compared to 5), somewhat less than the difference of 1.22 credits (3.67 compared to 3.89) when only average credits are considered.

Table II.1
Percentage of Graduates Participating in the Vocational and Personal Use Curricula and Average Credits Completed by Participants

	Percent Enrolled in Voc.	Avg. Credits in Voc.	Percent Enrolled in P. Use	Avg. Credits in P. Use
1969	92%	3.99	98%	1.95
1975-78	97	4.65	97	2.37
1979-82	98	5.00	99	2.43
1982	98	4.74	99	2.66
1987	98	4.53	98	2.73

Participation in the personal use curriculum was relatively constant over the years, fluctuating between 97 and 99 percent of all students. Because of the high rates of participation, the average number of credits completed by those participating in this curriculum were very close to the average number of credits for all students.

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[16] Credits earned by those participating is calculated by dividing average credits by the proportion of students participating. Hence, 3.67 ÷ 0.92 = 3.99. Alternatively, if the average participant earned 3.99 credits, but only 92 percent of students participated, average credits earned by all students in vocational education is 3.99 x 0.92 = 3.67.

Patterns of Participation in the High School Curriculum by Student Characteristics

The data presented thus far reflect the course-taking experiences of all high school graduates. Yet students with different characteristics exhibited different patterns of participation over time. This section describes how participation in the high school curriculum varied by sex, race and ethnicity, parents' education, high school grade average, and grade level.

At the aggregate level, males and females were very similar in their patterns of participation in the high school curriculum over time. The average number of credits completed in high school increased among both males and females between 1969 and 1987 (Table II.2). Among males, the average total credits completed increased from 20.21 in 1969 to 22.64 in 1987, an increase of 2.43 credits. Average total credits completed by females increased from 20.68 to 22.89, an increase of 2.21 credits. Females completed slightly more credits on average than males in every year.

The average number of credits completed by students from different racial or ethnic backgrounds also increased between 1969 and 1987, although the average increase varied by the students' race or ethnicity. The largest increase between 1969 and 1987 in total average credits completed occurred among whites (2.61 credits), while the smallest gains occurred among blacks (1.41 credits), Asians (.95 credits) and Hispanics (.76 credits). However, despite the relatively small increase, Asian students more high school course-work on average in each year than students from other racial or ethnic backgrounds.

While the average number of credits completed in high school increased for all students between 1969 and 1987, there were some patterns of participation that did not change. For example, students who earned higher grades also completed more credits in every year. This pattern was not just persistent at both ends of the grade spectrum, but appears to have been a linear relationship: as grades increased so too did the average number of credits completed. Similarly, the amount of education completed by a student's parents was also related to the number of credits students earned in high school, although the strength of this relationship varied by year. In general, students whose parents completed more education tended to

Table II.2
Average Total Credits Completed by High School Graduates between 1969 and 1987 by Selected Characteristics

	1969	1975-1978	1979-1982	1982	1987
Total	20.46	20.77	21.19	21.47	22.77
Sex					
Male	20.21	20.61	21.10	21.32	22.64
Female	20.68	20.90	21.27	21.62	22.89
Race/Ethnicity[17]					
Asian	22.87	–	–	22.13	23.82
Black	20.73	20.28	20.59	21.24	22.14
Hispanic	21.77	21.31	21.36	21.17	22.53
Native Amer.	–	–	–	21.42	23.15
White	20.30	20.80	21.28	21.55	22.91
HS GPA					
Mostly As	21.81	21.60	22.15	22.54	24.39
Mostly Bs	21.20	21.12	21.78	21.95	23.51
Mostly Cs	19.82	20.23	20.59	21.00	22.09
Mostly Ds	18.57	19.76	19.46	19.62	20.18
Father's Education†					
LT High School	20.00	20.31	21.01	21.30	–
High School Only	20.27	20.72	20.92	21.40	–
Some College	20.79	20.90	21.69	21.59	–
4 Years of College	20.87	21.27	21.50	21.95	–
Advanced Degree	20.68	21.65	22.18	22.00	–
Mother's Education†					
LT High School	19.98	20.27	20.84	21.01	–
High School Only	20.37	20.80	21.18	21.53	–
Some College	20.57	20.92	21.49	20.70	–
4 Years of College	20.56	21.75	21.82	21.92	–
Advanced Degree	20.48	20.95	20.77	22.09	–
Grade Level					
9th Grade	5.50	5.36	5.44	5.56	4.91
10th Grade	5.40	5.47	5.54	5.58	4.87
11th Grade	5.40	5.27	5.42	5.43	4.87
12th Grade	4.17	4.62	4.78	4.83	4.42
Grade Unknown	–	0.05	0.01	0.07	3.70

† Data for these variables were not available in the 1987 data.

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[17] White and Asian students were combined in the NLS-Youth data set (1975-78, 1979-82). Since Asians and other non-whites were such a small proportion of total enrollments in these years, the non-black/non-Hispanic category has been included in this table as whites. Native American students were only represented in the 1982 and 1987 cohorts. Black and Hispanic students were represented in every cohort, although the criteria used for identifying them differed slightly from one data set to another. See Appendix 1 for a detailed description of the classification rules.

complete more credits in high school. However, the effect of parents education was much weaker in 1969, when there was no difference in the number of credits completed by students whose parents had completed any college at all.

Another pattern of participation that did not appear to change between 1969 and 1987 was the timing of credits earned. In the years 1969 to 1982, students completed approximately the same number of credits in each of their first three years in high school. There was then a relatively sharp decline in the number of credits completed in the twelfth grade. Because many of the courses in the class of 1987 data were missing grade level data, we could not classify many courses by when the student earned these credits; hence it is difficult to make direct comparisons with the patterns of course taking in previous years. However, the distribution of credits for which the year was known in 1987 is very like the distribution of credits by grade in the other years, so one could conclude that the timing of credits earned probably did not change much between 1982 and 1987.

Participation of Handicapped Students in the High School Curriculum in 1987

The Carl Perkins Vocational Education Act specifies that 10 percent of the funding authorized by the Act must be set aside to serve the needs of handicapped students in vocational education. Therefore, we have calculated the number of credits completed by handicapped students who earned a regular high school diploma in 1987. Unfortunately, the 1987 data set—the National Assessment of Educational Progress—was the only one to explicitly include handicapped students. The other data sets, notably High School and Beyond (1982), may include handicapped students, but these students are not explicitly identified as such. Thus, we were not able to represent the course taking patterns of handicapped students over time.

Handicapped graduates completed fewer credits overall in high school than high school graduates generally, 21.89 credits compared to 23.77 (Table II.3). Compared to all high school graduates, those who were disabled completed fewer credits in the academic curriculum, and more credits in both the vocational and the personal use curricula.

Summary of General Trends in Course Taking

Between 1969 and 1987, public high school graduates consistently earned more credits on average than had the graduates of prior years. This pattern was consistent among males and

Table II.3
Credits Completed by Disabled Graduates in 1987 and Distribution of Credits in Academic, Vocational, and Personal Use Curricula

	Total High School Credits	Credits Earned in Academic Curric.	Credits Earned in Vocational Curric.	Credits Earned in Personal Use Curric.
Disabled Students	21.86	12.54	5.99	3.32
% of Credits	100%	57%	27%	16%
All Students	22.77	15.74	4.44	2.69
% of Credits	100%	69%	19%	12%

females, students from different racial or ethnic backgrounds, and students with different grade averages. Despite this consistent increase in the average number of credits completed, the total number of credits was composed of different proportions of academic and vocational coursework in the different years. The period 1969 to 1987 really comprised two periods during which patterns of participation in the high school curriculum went in opposite directions. Between 1969 and 1979-82, students completed an increasing proportion of their credits in the vocational curriculum and a declining proportion of their credits in the academic curriculum. Between 1979-82 and 1987, the proportion of credits completed in the academic curriculum increased while the proportion of credits completed in the vocational curriculum decreased. The proportion of credits completed in the personal use curriculum held steady throughout the entire period 1969 to 1987.

Certain patterns of participation persisted between 1969 and 1987, even though total credits increased and the distribution of those credits within the different curricula changed over time. Females consistently completed more credits than males, although the difference was small. Similarly, students with higher grades routinely completed more credits than students with lower grades. Another pattern that did not change was the timing of coursework. Between 1969 and 1987, students completed more credits on average in each of their first three years in high school than they completed as seniors.

CHAPTER III

TRENDS IN SECONDARY ACADEMIC ENROLLMENTS

This chapter addresses enrollment changes in the academic curriculum that have taken place between 1969 and 1987. The academic curriculum comprises six subject areas: mathematics, science, English, social studies, fine arts, and foreign languages. These main subject areas are then sub-divided into courses that are considered elementary, general, or more advanced. In this way, one can see the overall changes in students' academic programs and also how specific student characteristics are related to the degree of complexity of academic courses taken.

Enrollment changes in the academic curriculum will be evaluated by comparing the average number of credits earned within a given area of study over time. Virtually one hundred percent of the students participate in all academic fields except fine arts and foreign languages. Therefore, participation, measured as the proportion of students who earn credits, will be discussed primarily in relation to specific courses within a given area of study, and only when participation does not correlate with changes in the number credits earned. With a few exceptions, changes in credits earned reflect changes in the level of participation.

Overall Enrollment Changes in the Academic Curriculum

As Figure III.1 indicates, a specific pattern of enrollment emerged over time as measured by the average number of academic credits earned by students in 1969, 1975-1978, 1979-1982, 1982, and 1987. Students tended to earn a relatively high number of academic credits in 1969 (14.89); the average then dropped to its lowest in the 1979-1982 cohort (13.9); began to increase again in 1982 (14.17); and was highest in 1987 (15.74). The biggest increase in the number of credits earned occurred between 1982 and 1987. Math had the biggest increase; credits earned rose from 2.55 in 1982 to 3.02 in 1987 (Table III.1).

The change over time exhibited in Figure III.1 was also true for each academic field with the exception of fine arts. In fine arts, the lowest number of credits was earned in 1969 (1.17). The number of credits then increased in 1975-1978 and remained approximately the same throughout the rest of the cohorts. The percentage of students participating in this field

Figure III.1

Average Number of Academic Credits Earned by Public High School Graduates: 1969-1987

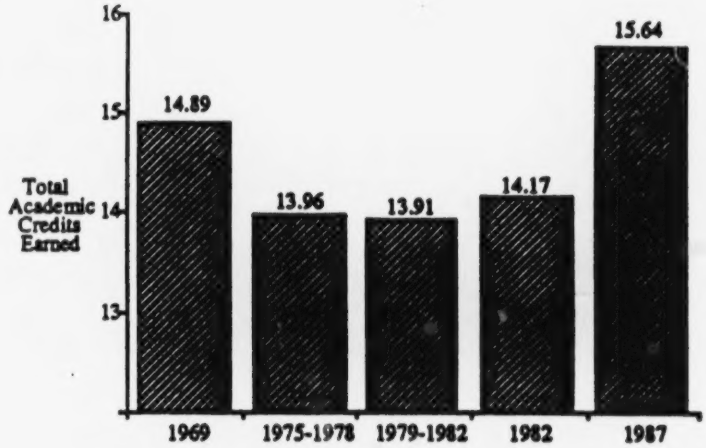

Table III.1

Average Number of Course Credits Earned by Public High School Graduates in Academic Subjects, 1969 to 1987

	All Math Credits	All Science Credits	All English Credits	All Soc St Credits	All Fine Arts Credits	All Foreign Lang Credits
1969	2.47	2.23	4.07	3.39	1.17	1.57
1975-1978	2.35	2.26	3.69	3.15	1.40	1.11
1979-1982	2.44	2.18	3.76	3.12	1.47	0.92
1982	2.55	2.17	3.87	3.16	1.46	0.97
1987	3.02	2.51	4.00	3.31	1.42	1.36

followed the same pattern: 63 percent participated in fine arts in 1969, and 67 to 68 percent participated in all the other cohorts.

The number of credits earned in math and science were higher in 1987 than in 1969. The courses contributing most heavily to this increase were not the most elementary, but tended to be either more advanced or "core" courses. For example, in math, the courses demonstrating the biggest increases in credits earned between 1982 and 1987 were Geometry and Advanced Math.[18] Likewise, in science, Biology and Chemistry had the most significant increases in credits earned between 1982 and 1987.

The changes over time in the total number of academic credits earned by males and females followed the same pattern as that observed for the whole population. However, females tended to earn more academic credits than males, a difference that increased over time (Table III.2). In 1969, males and females earned approximately equal numbers of academic credits (14.94 and 14.89 respectively). In 1982, females earned approximately 0.5 credits more than males, and in 1987 the difference increased to 0.70 (15.28 vs 15.98).

Table III.2

Average Number of Academic Credits Earned by Public High School Graduates: Males and Females: 1969-1987

	Males	Females
1969	14.94	14.89
1975-1978	13.89	14.02
1979-1982	13.84	13.95
1982	13.91	14.41
1987	15.28	15.98

This tendency for females to earn more academic credits than males, however, was primarily a reflection of participation by Asian and white students. Black female students earned slightly fewer credits than black male students until 1987, when females earned an average of 15.03 credits compared to 14.88 for black males (Figure III.2). The same is true for Hispanic students: males earned slightly more credits than females up until 1982 when females earned 0.37 credits more credits than Hispanic males. This difference increased to 0.40 credits for females in 1987 (Figure III.3). It is possible that the gender distribution of academic credits earned by black and Hispanic students is following that of Asian and white students, beginning at a later point in time.

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[18] Advanced Math includes such courses as Algebra II and III, Trigonometry, and Statistics.

Figure III.2

Average Number of Academic Credits Earned by Black Public High School Graduates: 1969-1987

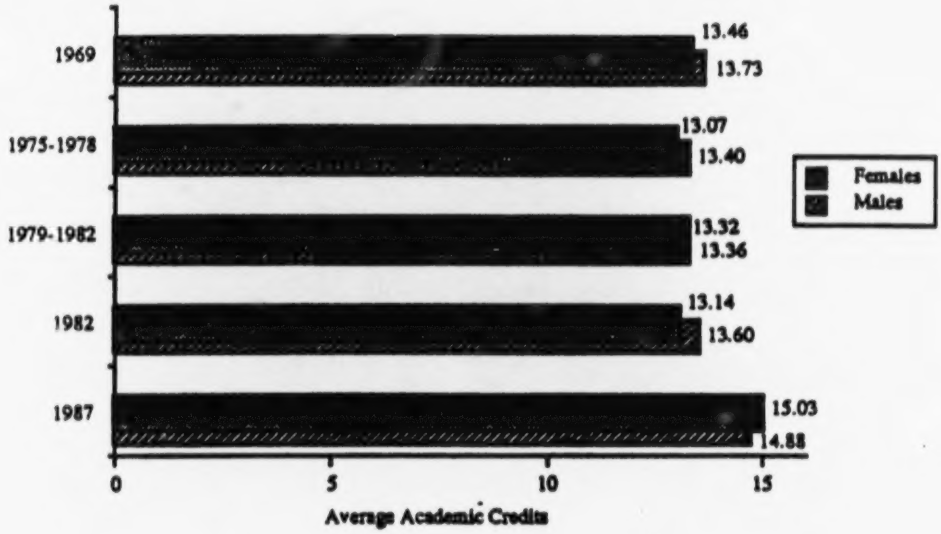
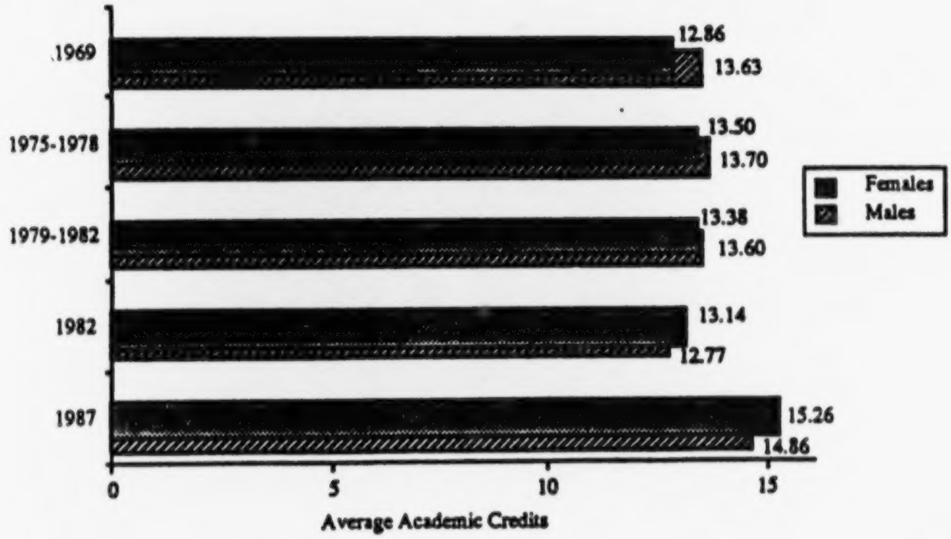


Figure III.3

Average Academic Credits Earned by Hispanic Public High School Graduates 1969-1987



In math and science subjects, the average number of credits earned by males and females converged over time. For these subjects, females, unlike males, showed no decline in the number of credits earned between 1969 and 1979-1982 (Figure III.4 and III.5). In addition, the number of credits earned between 1982 and 1987, increased slightly more for females than for males. In math, males earned an average of 0.5 credits more than females in 1969. This difference subsequently declined to 0.3 credits in 1975-1979, 0.26 credits in 1979-1982, 0.17 credits in 1982, and only 0.09 credits in 1987. Similarly, for science, the biggest difference in credits earned between males and females was in 1969 (males earned 0.28 credits more than females) and steadily decreased to a low of 0.04 credits difference in 1987.

Figure III.4

Average Number of Credits Earned by Public High School Students in Math

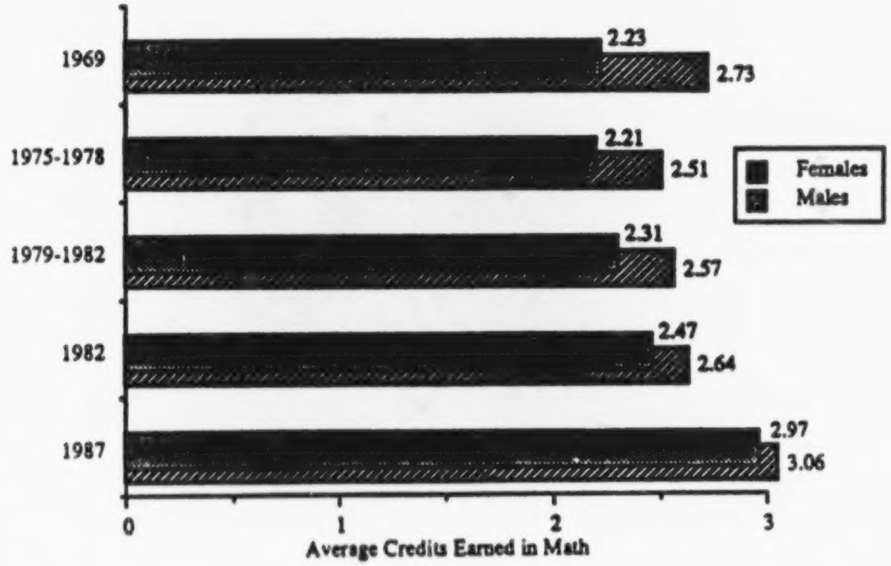
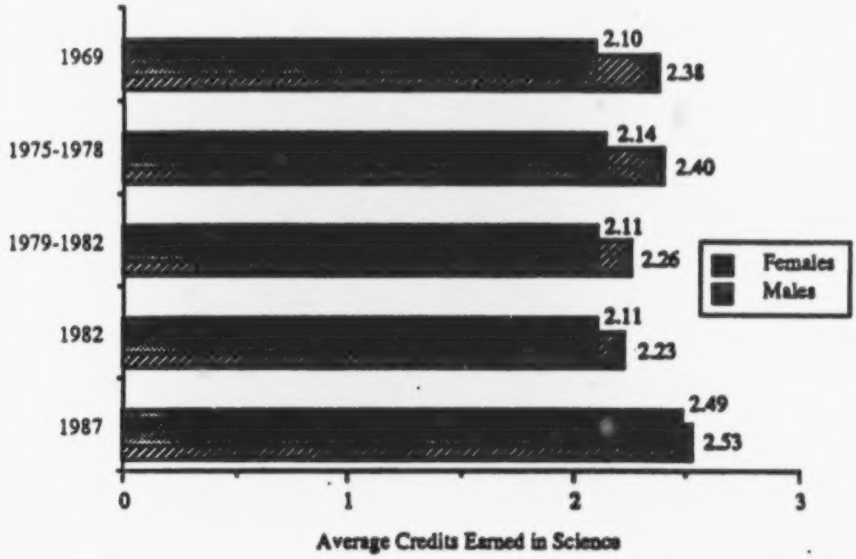


Figure III.5

Average Number of Credits Earned in Science by Public High School Graduates: 1969-1987



Males and females differed very little in the average number of English credits earned in all cohorts and virtually no difference was seen between males and females in the average number of credits earned in social studies.

In fine arts and foreign languages, females consistently earned more credits than males: females earned from 0.33 to 0.48 more credits than males in fine arts and from 0.19 to 0.39 more credits than males in foreign languages. These differences fluctuated over time rather than showing any consistent increase or decrease.

There were obvious racial/ethnic differences observed in the number of academic credits completed. As depicted in Table III.4, Asian students consistently earned more academic credits than any other racial/ethnic group.[19] This difference appeared to be increasing over time.

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[19] In the NLSY cohorts (1975-1978 and 1979-1982) the white and Asian students were not represented separately. Native American students were only represented in the 1982 and 1987 cohorts. Black and Hispanic students were represented in every cohort.

Table III.3.

Average Number of Academic Credits Earned by Public High School Graduates in All Subjects, 1969 to 1987: Sex and Race/Ethnicity

	All Math Credits	All Science Credits	All English Credits	All Soc St Credits	All Fine Arts Credits	All Foreign Lang Credits
1969						
Male	2.73	2.38	4.10	3.36	0.99	1.38
Female	2.23	2.10	4.05	3.42	1.32	1.77
Asian	3.12	2.38	3.80	3.19	1.03	2.16
Black	2.19	2.02	3.80	3.26	1.31	0.95
Hispanic	2.22	2.01	3.49	2.97	1.69	1.07
White	2.52	2.28	4.15	3.43	1.13	1.71
Other/Unknown	1.77	2.25	4.14	3.52	1.28	1.23
1975-1978						
Male	2.51	2.40	3.71	3.18	1.14	0.94
Female	2.21	2.14	3.66	3.13	1.62	1.26
Black	2.28	1.96	3.85	3.22	1.23	0.66
Hispanic	2.18	1.98	3.64	3.13	1.37	1.28
Non-Blk/Hisp	2.37	2.31	3.67	3.15	1.42	1.16
1979-1982						
Male	2.57	2.26	3.78	3.14	1.27	0.82
Female	2.31	2.11	3.75	3.10	1.67	1.01
Black	2.40	1.95	3.93	3.23	1.25	0.57
Hispanic	2.42	1.81	3.69	3.08	1.32	1.17
Non-Blk/Hisp	2.45	2.24	3.74	3.10	1.52	0.96
1982						
Male	2.64	2.23	3.84	3.15	1.28	0.78
Female	2.47	2.11	3.90	3.17	1.62	1.14
Asian	3.14	2.57	3.81	3.17	1.33	1.87
Black	2.55	2.04	4.07	3.11	1.25	0.71
Hispanic	2.24	1.78	3.87	3.00	1.30	0.75
Nat Am	2.09	1.96	3.94	3.24	1.69	0.43
White	2.60	2.25	3.84	3.20	1.51	1.03
1987						
Male	3.06	2.53	3.98	3.29	1.24	1.16
Female	2.97	2.49	4.02	3.33	1.60	1.55
Asian	3.70	3.00	4.03	3.46	1.16	2.48
Black	2.96	2.31	4.09	3.32	1.19	1.09
Hispanic	2.86	2.20	3.94	3.19	1.33	1.48
Native Am	3.06	2.44	4.03	3.19	1.69	0.75
White	3.03	2.57	4.01	3.29	1.49	1.35

Table III.4

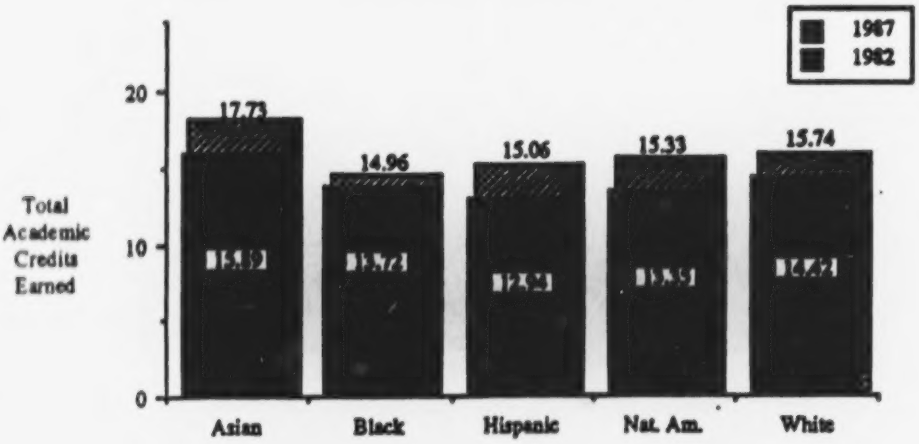
Average Number of Academic Course Credits Earned by Public High School Graduates: Race/Ethnicity

	Asian	Black	Hispanic	Nat. Am.	White
1969	15.61	13.53	13.44	Not Included	15.22
1982	15.89	13.72	12.94	13.35	14.42
1987	17.73	14.96	15.06	15.33	15.74

In 1969 Asian students earned 0.39 more credits than white students, in 1982 this difference increased to 1.47 credits, and in 1987, Asian students earned 1.99 more academic credits than white students. White students consistently earned the second highest number of academic credits over time. Overall, black, Hispanic, and Native American students earned fewer academic credits than either white or Asian students. The biggest increase in credits for all racial/ethnic groups was seen between 1982 and 1987 (Figure III.6).

Figure III.6

Average Number of Academic Credits Earned by Public High School Students in 1982 and 1987



The change in academic credits earned over time for Hispanic students diverged from the overall general pattern observed in which a relatively high number of credits was earned in 1969, followed by a decrease in the intervening cohorts, and then increasing again in 1982 and

1987. In 1969 Hispanic students earned an average of 13.44 academic credits followed by an increase to 13.59 credits in 1975-1978. In the next two cohorts their average decreased to a low of 12.94 credits in 1982, followed by a dramatic increase to 15.06 credits in 1987. Between 1982 and 1987 credits earned by Hispanic students increased more than any other racial/ethnic group (Figure III.6).

For the three cohorts in which Asian, black, Hispanic, and white students were represented (1969, 1982, and 1987), Asian students earned consistently more math, science, and foreign language credits than any other racial/ethnic group (Table III.3). The differences among other racial/ethnic groups were not as pronounced, though white students tended to earn more credits in math and science than either black or Hispanic students.

Examining student characteristics other than gender and race/ethnicity showed few obvious changes over time in the number of academic credits earned. In every cohort, the student characteristics including parents' education, postsecondary education plans, and high school grades were highly correlated with the number of academic credits earned (Table III.5). For example, the higher the level of either parent's education, the more academic credits that were earned, on average, by the students. Likewise, the higher the level of postsecondary education plans, or the higher the grades earned in high school, the higher the number of academic credits earned.

There was also a consistent correlation seen over time, between the number of academic credits earned and the region of the country where the students attended high school (Table III.5). Students from the North East tended to earn more academic credits than any other region, while students from the remaining regions showed few differences among them. The difference between the North East and the region with the fewest credits peaked in the 1979-1982 cohort, where students from the North East earned an average of 15.45 academic credits compared to 13.04 credits for students in the West.

Individual Subject Areas

Each subject area consists of a diverse curriculum of courses. For math, science, and foreign languages, different courses also represent different levels of complexity. Thus, it is important to distinguish the participation patterns among the individual course areas in order to accurately evaluate changes in participation in the overall academic curriculum. Table III.6 shows the level of participation for individual courses within each subject area and will be referred to throughout this section.

Table III.5

Average Number of Academic Credits Earned by Public High School Graduates 1969-1987[20]

	1969	1975-78	1979-82	1982	1987
Father's Educ					
HS Only	14.80	13.37	13.19	13.75	–
Some College	15.94	14.74	14.59	14.78	–
4 Yrs College	16.79	15.90	15.70	15.22	–
Adv Degree	16.22	16.81	16.98	16.52	–
Mother's Educ					
LT High School	13.83	12.49	12.80	13.08	–
HS Only	14.74	13.68	13.71	14.02	–
Some College	15.66	15.18	14.64	14.95	–
4 Yrs College	16.43	16.78	16.30	16.21	–
Adv Degree	16.75	16.19	17.30	16.52	–
PSE Plans					
HS Only	–	11.91	12.07	11.95	–
Some College	–	13.19	12.98	12.53	–
4 Yrs. College	–	15.16	15.35	15.89	–
GT 4 Yrs Coll	–	16.46	16.74	16.75	–
HS Grades					
Mostly A	18.01	15.86	16.07	15.82	18.80
Mostly B	15.82	14.31	14.67	13.81	16.61
Mostly C	13.75	12.92	12.74	12.64	14.37
Below C	12.74	12.66	11.78	12.13	12.85
Region					
N East	–	15.09	15.45	15.65	17.03
N Central	–	13.30	13.30	13.74	14.99
South	–	14.04	14.04	13.75	15.36
West	–	13.61	13.04	13.76	15.60

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[20] A dashed line indicates unavailable data in that cohort for the specific student characteristic.

Table III.6

Percentage of Public High School Graduates with Credits Earned in All Academic Subjects: 1969-1987

	1969	1975-1978	1979-1982	1982	1987
MATH					
Basic	30.03	14.86	8.78	9.14	11.56
General	21.29	30.12	35.16	34.82	26.89
Applied	3.03	7.59	11.39	16.15	31.01
Pre-Algebra	*	8.68	8.99	20.91	22.19
Algebra	73.23	61.01	64.22	55.63	65.61
Geometry	51.29	46.92	47.99	45.59	58.71
Calculus	1.05	2.37	2.98	4.61	6.49
Advanced/Other	42.19	36.84	40.90	40.72	48.59
SCIENCE					
Survey	71.55	51.08	49.89	70.18	72.18
Biology	86.14	83.56	79.63	79.31	89.39
Chemistry	36.75	35.85	33.29	32.19	42.66
Physics	13.36	33.51	36.69	16.93	20.14
ENGLISH					
Survey	99.90	98.30	98.27	98.16	99.52
Literature	2.03	43.07	41.99	45.41	29.60
Composition	8.09	32.46	36.61	33.92	24.99
Speech	17.38	20.46	23.67	19.90	19.28
FOREIGN LANGUAGE					
All Foreign Language	65.76	54.31	49.21	49.33	63.61
Year 1	63.08	48.50	43.57	44.20	58.78
Year 2	47.81	33.88	26.66	28.92	41.40
Year 3 or more	19.11	14.40	11.33	13.61	17.22
French	26.64	16.64	14.72	15.95	20.12
Spanish	29.80	30.34	28.20	29.29	38.43
Latin	10.24	3.87	2.21	3.32	3.65
German	7.98	6.89	6.31	4.58	5.27
SOCIAL STUDIES					
American History	98.71	93.43	94.37	88.26	93.15
World History	78.27	52.60	52.27	42.81	46.75
American Government	86.97	61.15	61.69	63.67	72.77
Social Science	41.17	75.73	78.53	80.85	81.90
FINE ARTS					
All Fine Arts	63.28	66.93	68.04	68.02	67.09
Arts & Crafts	35.30	41.23	43.24	45.20	40.98
Music	36.36	36.03	36.15	35.56	34.76
Drama/Dance	8.55	10.93	10.65	8.45	12.49

* < 0.01 credits

Math

The mathematics curriculum was broken down into the following categories: Basic Math which included developmental and remedial courses; General Math consisting primarily of seventh and eighth grade math; Applied Math which included computer math and math used in employment; Pre-Algebra; Algebra I; Geometry; and Advanced/Other math which included Algebra II and III, Trigonometry, and Statistics. Students earned the most credits (and hence, had the greatest participation) in Algebra I. As shown in Table III.6, between 56 and 73 percent of the students earned credits in Algebra I, followed by Geometry (46 to 59 percent), Advanced/Other (37 to 49 percent), General Math (21 to 35 percent), Basic and Applied Math (3 to 31 percent), and finally, pre-Algebra (0 to 22 percent).

The pattern of credits earned over time in math varied according to the type of course taken (Figures III.7a and III.7b). For example the average number of credits earned in Basic Math, and Algebra was highest in 1969, declined in the intervening cohorts, and increased again in 1987. In both cases, the number of credits earned in 1987 was less than the number earned in 1969. Geometry followed a similar pattern but the average number of credits earned in 1987 was higher than the number earned in 1969. Applied Math, Pre-Algebra, Calculus and (after an initial decline in the 1975-1978 cohort) Advanced Math showed a consistent increase in the number of credits earned over time. A relatively unique pattern (the opposite of that seen for all math credits) was observed for General Math with few credits earned in 1969 (0.23) followed by a doubling of credits earned between 1975 and 1982, and then dropping down to 0.34 credits in 1987.

In all cases, changes in the number of credits earned was strongly correlated with participation. Thus, those courses with the greatest participation (i.e. Algebra and Geometry), reflected the overall pattern seen in the total number of math credits earned.

Figure III.7a

Average Number of Credits Earned in Basic Math Courses

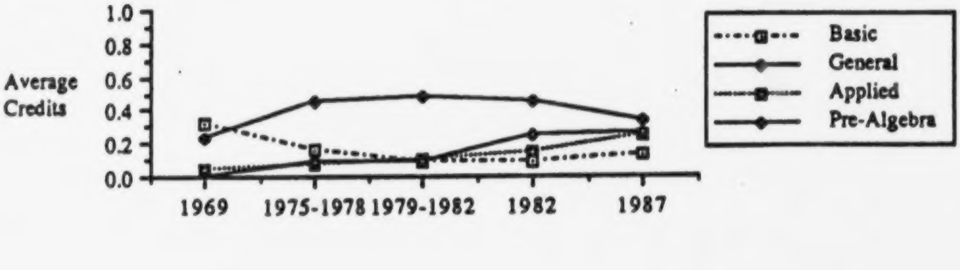
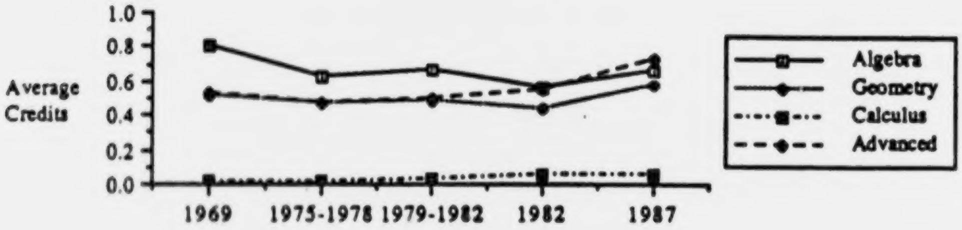


Figure III.7b

Average Number of Credits Earned in More Advanced Math Courses



When examining the number of credits earned according to gender, in each cohort, males and females earned roughly similar numbers of credits in Basic Math, General Math, Pre-Algebra, Algebra, and Calculus (Table III.7). Those courses that reflected the gender pattern observed for total math credits (i.e. increased gender parity over time), were Applied Math, Geometry, and Advanced Math, all of which displayed a gradual, but consistent convergence in the number of credits earned by males and females.

There were differences observed in math course-taking patterns among the racial/ethnic groups that were sustained over time. For example, black, Hispanic, and Native American students tended to take more credits in Basic Math, General Math, Applied Math, and pre-Algebra, and fewer credits in Algebra, Geometry, Calculus, and Advanced Math when compared to Asian and white students. Asian students tended to take the fewest credits in the more elementary courses and the most credits in the more advanced courses. The more advanced the math course, the more pronounced the difference became in the number of credits earned between Asian students and any other race/ethnic group.

Between 1982 and 1987, when the biggest increase in math credits was seen for all racial/ethnic groups, Asian and white students had the biggest increase in Advanced Math (Asians increased from 0.98 to 1.18 credits, whites increased from 0.64 to 0.80 credits). Black students showed roughly similar credit increases in Applied Math (0.17 to 0.28), Algebra (0.47 to 0.59), and Geometry (0.30 to 0.43); Hispanic students had the biggest increase in credits in Basic Math (0.15 to 0.35); and Native Americans had the biggest increase in credits between 1982 and 1987 in Applied Math (0.12 to 0.43).

Table III.7

Average Number of Course Credits Earned by Public High School Graduates in Math Subjects, 1969-1987: Sex and Race/Ethnicity

	Basic Math Credits	General Math Credits	Applied Math Credits	Pre Algebra Credits	Algebra Credits	Geometry Credits	Calculus Credits	Advanced Other Credits
1969								
Male	0.33	0.25	0.09	*	0.85	0.57	0.01	0.63
Female	0.31	0.21	0.01	*	0.79	0.48	*	0.43
Asian	0.14	0.19	*	*	0.82	0.76	0.01	1.18
Black	0.51	0.33	0.01	*	0.77	0.27	*	0.30
Hispanic	0.61	0.33	*	*	0.67	0.27	*	0.34
White	0.28	0.21	0.06	*	0.83	0.58	0.01	0.56
Other/Unknown	0.32	0.27	0.06	*	0.59	0.18	*	0.35
1975-1978								
Male	0.17	0.45	0.08	0.09	0.64	0.50	0.03	0.55
Female	0.15	0.45	0.05	0.08	0.62	0.44	0.02	0.39
Black	0.24	0.74	0.14	0.14	0.50	0.26	0.01	0.25
Hispanic	0.16	0.52	0.06	0.11	0.66	0.35	0.01	0.30
Non-Blk/Hisp	0.15	0.41	0.06	0.08	0.64	0.50	0.03	0.50
1979-1982								
Male	0.10	0.51	0.12	0.09	0.65	0.50	0.03	0.57
Female	0.08	0.45	0.09	0.09	0.68	0.47	0.03	0.44
Black	0.15	0.80	0.14	0.12	0.57	0.27	0.01	0.33
Hispanic	0.09	0.52	0.08	0.18	0.67	0.40	0.02	0.46
Non-Blk/Hisp	0.08	0.42	0.10	0.08	0.68	0.52	0.03	0.53
1982								
Male	0.11	0.50	0.16	0.23	0.55	0.45	0.05	0.59
Female	0.08	0.40	0.12	0.25	0.59	0.46	0.04	0.54
Asian	0.08	0.33	0.15	0.19	0.60	0.68	0.13	0.98
Black	0.20	0.72	0.17	0.31	0.47	0.30	0.02	0.36
Hispanic	0.15	0.68	0.17	0.24	0.45	0.24	0.02	0.30
Nat Am	0.26	0.49	0.12	0.27	0.40	0.25	0.02	0.29
White	0.07	0.37	0.13	0.23	0.60	0.51	0.05	0.64
1987								
Male	0.14	0.38	0.27	0.25	0.66	0.57	0.07	0.73
Female	0.12	0.30	0.24	0.26	0.68	0.59	0.05	0.73
Asian	0.09	0.22	0.21	0.27	0.71	0.75	0.26	1.18
Black	0.25	0.63	0.28	0.29	0.59	0.43	0.03	0.46
Hispanic	0.35	0.44	0.30	0.37	0.59	0.40	0.03	0.38
Native Am	0.10	0.48	0.43	0.50	0.67	0.45	*	0.42
White	0.09	0.29	0.25	0.23	0.69	0.62	0.06	0.80

* < 0.01 credits

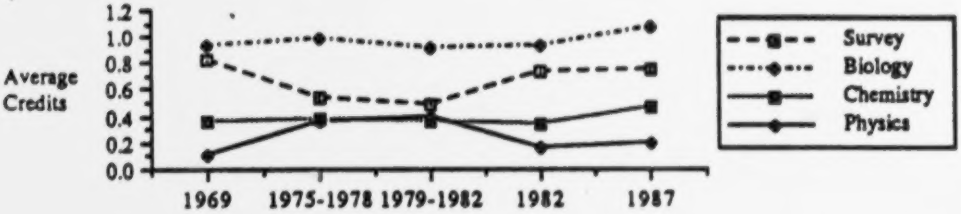
Science

The sciences were broken down into Survey Science, which included introductory science and physical science courses, Biology, Chemistry, and Physics courses. Referring back to Table III.6, participation was greatest in Biology (79 to 89 percent) followed by Science Survey (50 to 72 percent), Chemistry (32 to 43 percent) and Physics (13 to 37 percent).

As in the case of mathematics, the pattern of credits earned in science varied with the type of course (Figure III.8). The average number of credits earned in Biology and Chemistry remained relatively uniform from 1969 to 1982 and then increased between 1982 and 1987 (from 0.93 to 1.08 for Biology and from 0.34 to 0.47 in Chemistry). The change in the average number of credits earned over time for Physics and Science Survey courses differed from Chemistry and Biology, especially if only the years 1969, 1982, and 1987 are taken into account.[21] For Physics, there is a consistent increase in credits earned over time from 0.11 in 1969, to 0.16 in 1982, to 0.20 in 1987. In Science Survey, on the other hand, the highest number of credits earned was in 1969 (0.83) and then dropped to 0.74 credits in 1982 and 0.76 credits in 1987.

Figure III.8

Average number of Credits Earned in Science Courses[22]



The distribution of science credits according to gender changed over time for some courses, while others remained relatively static (Table III.8). The convergence of science credits earned by males and females that was observed overall, was primarily due to changes in the gender distribution for Science Survey and Chemistry. In both cases, males earned slightly more credits than females in 1969 (for Science Survey, males earned 0.92 credits compared to

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[21] In the NLSY 1975-1978 and 1979-1982 cohorts, the course, Introduction to Physical Science, was given the same code as Physics I. Therefore, the average number of credits in the Physics category is inflated for these years while the average number of credits for Science Survey is underestimated.

[22] See Footnote 4.

Table III.8

Average Number of Course Credits Earned by Public High School Graduates in Science and English, 1969-1987: Sex and Race/Ethnicity

SCIENCE					ENGLISH			
	Science Survey Credits	Biology Credits	Chemistry Credits	Physics Credits	English Survey Credits	English Lit Credits	English Comp Credits	English Speech Credits
1969								
Male	0.92	0.88	0.42	0.16	3.87	0.01	0.07	0.14
Female	0.74	0.99	0.32	0.06	3.80	0.02	0.09	0.14
Asian	1.08	0.69	0.47	0.15	3.34	0.17	0.13	0.16
Black	0.87	0.95	0.17	0.04	3.64	0.02	0.02	0.12
Hispanic	0.99	0.89	0.11	0.03	3.24	0.04	0.16	0.05
White	0.80	0.94	0.41	0.13	3.90	0.01	0.09	0.14
Other/Unknown	1.13	0.83	0.18	0.12	3.83	0.03	0.11	0.16
1975-1978								
Male	0.56	0.97	0.42	0.45	2.89	0.44	0.23	0.15
Female	0.51	0.99	0.35	0.29	2.84	0.40	0.28	0.14
Black	0.55	0.84	0.20	0.37	3.28	0.28	0.17	0.13
Hispanic	0.51	0.86	0.34	0.28	2.90	0.38	0.20	0.16
Non-Blk/Hisp	0.53	1.00	0.41	0.37	2.81	0.44	0.27	0.14
1979-1982								
Male	0.57	0.86	0.37	0.46	2.90	0.42	0.29	0.17
Female	0.48	0.98	0.33	0.32	2.83	0.43	0.34	0.16
Black	0.54	0.83	0.21	0.37	3.24	0.32	0.25	0.11
Hispanic	0.33	0.84	0.24	0.33	2.84	0.43	0.31	0.12
Non-Blk/Hisp	0.48	0.94	0.38	0.39	2.80	0.44	0.33	0.17
1982								
Male	0.78	0.89	0.35	0.21	2.93	0.51	0.27	0.13
Female	0.71	0.96	0.33	0.12	2.92	0.53	0.32	0.14
Asian	0.51	1.08	0.60	0.39	2.89	0.49	0.34	0.08
Black	0.82	0.88	0.25	0.09	3.28	0.42	0.25	0.13
Hispanic	0.77	0.79	0.15	0.06	3.12	0.42	0.23	0.11
Nat Am	0.72	0.77	0.35	0.11	3.00	0.47	0.35	0.12
White	0.73	0.96	0.38	0.19	2.84	0.55	0.31	0.14
1987								
Male	0.78	1.04	0.47	0.25	3.37	0.30	0.18	0.13
Female	0.73	1.13	0.47	0.16	3.32	0.33	0.24	0.13
Asian	0.65	1.11	0.80	0.43	3.28	0.25	0.16	0.09
Black	0.90	1.00	0.31	0.11	3.61	0.23	0.16	0.09
Hispanic	0.77	1.05	0.28	0.09	3.44	0.24	0.18	0.08
Native Am	0.81	1.22	0.32	0.09	3.77	0.25	0.20	0.04
White	0.74	1.11	0.50	0.22	3.31	0.33	0.22	0.15

0.74 credits for females, and for Chemistry, males earned 0.42 credits compared to 0.32 credits for females). The difference between males and females subsequently decreased over time, and by 1987 they earned the same number of credits in Chemistry and differed by only 0.05 credits in Science Survey. By contrast, for every cohort, females tended to earn more credits than males in Biology, while males tended to earn more credits than females in Physics.

The distribution of science credits according to race/ethnicity showed that Asian students consistently earned more credits than any other racial/ethnic group in Chemistry and Physics. For these same subjects, white students tended to earn more credits than black, Hispanic, or Native American students. Racial/ethnic differences were not so pronounced in Science Survey and Biology. Asian students earned slightly more Science Survey credits than other racial/ethnic groups in 1969 but the fewest credits in this subject in 1982 and 1987. By contrast, black students earned the most credits in Science Survey in all cohorts except 1969. The differences among the remaining racial/ethnic groups differed only slightly for Science Survey. There were few consistent patterns among the racial/ethnic groups for Biology. For example, Asians earned the fewest number of Biology credits in 1969 and the most credits in 1982. In 1987 there were no significant differences among the racial/ethnic groups in biology except between Native Americans, who had the highest number of credits (1.22) and black students, who had the lowest (1.0) number.

English

The different areas of English were broken down (by level of participation) into English Survey, English Literature, English Composition, and Speech. English Survey was the only area of study that showed an increase in the number of credits earned between 1982 and 1987 (Figure III.9).[23] English Survey showed little change between 1975 and 1982 and then increased from 2.93 credits earned in 1982 to 3.34 credits earned in 1987. This increase, however, was not accompanied by a proportional increase in participation (Table III.6). Therefore, the increase in credits was due to students taking more credits in these areas. The number of credits earned in English Composition and Speech peaked in the 1979-1982 cohort (0.31 and 0.16 credits respectively), and decreased to 0.21 and 0.13 credits respectively in

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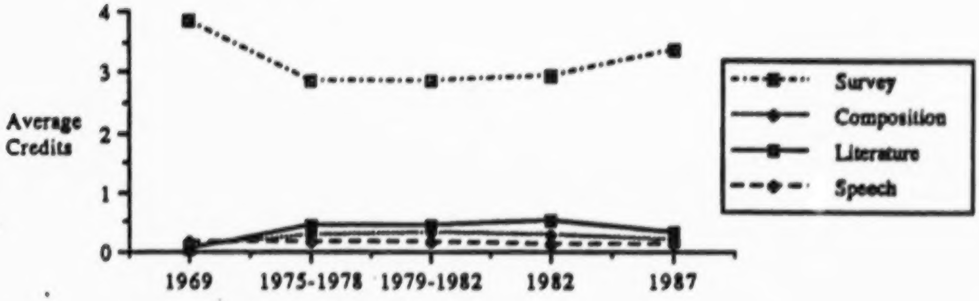
[23] In English Survey, a subject with nearly 100 percent participation, there was a drop of almost a credit in the average number of credits earned between 1969 (3.83) and 1975-78 (2.86). However, this was probably an artifact of the course coding system in 1969 since there was a dramatic increase in the number of credits earned (and the percentage of students participating) in English Composition and English Literature. It is likely that English Composition and English Literature were coded as English Survey in 1969.

1987. The number of credits earned in English Literature consistently increased over time until 1982, and then dereased from 0.52 credits in 1982 to 0.32 credits in 1987.

Figure III.9

Average Number of Credits Earned in English Courses



Males and females generally earned similar numbers of credits in the different English subjects with the exception of English Composition where females tended to earn slightly more credits than males (Table III.8).

No consistent English course-taking patterns could be readily discerned according to race/ethnicity. However, black, Hispanic, and (in 1982 and 1987 only) Native American students tended to earn more English Survey credits than either white or Asian students, while white students tended to earn more credits in English Literature than any other racial/ethnic group. The number of credits earned in Speech fluctuated; for example, Asian students earned the most Speech credits in 1969, the fewest in 1982, and approximately the same number as black and Hispanic students in 1987.

Foreign Languages

Foreign languages were broken down by year and also according to specific languages (Figures III.10a and III.10b). Participation in foreign languages decreased as the year level increased. Referring back to Table III.6, between 44 and 63 percent of the students participated in first year language, 27 to 48 percent participated in second year language, and 11 to 19 percent participated in third year (or higher) language. In the first and second year languages, the highest number of credits was earned in 1969 followed by 1987. In the third (or higher) year, the highest number of credits was also earned in 1969 but there was very little change between 1975 and 1987.

Figure III.10a

Average Number of Credits Earned in Foreign Languages by Year Taken

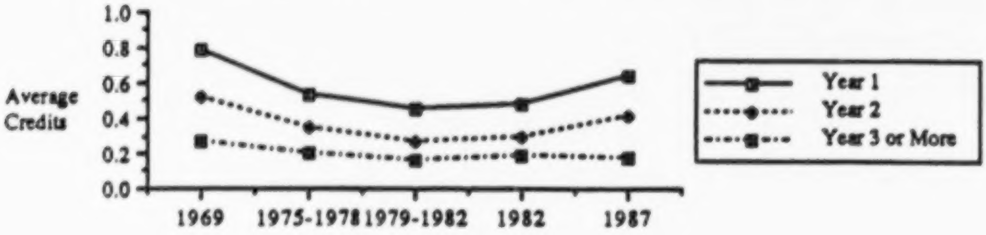
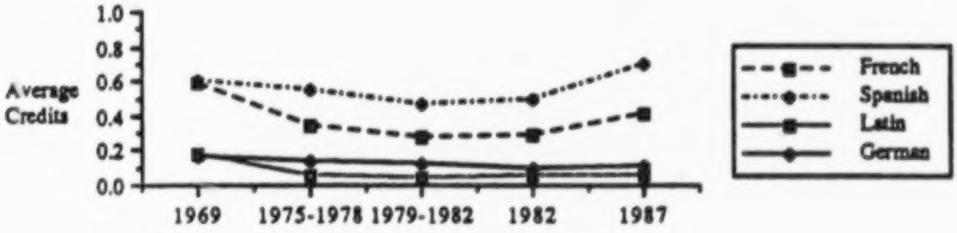


Figure III.10b

Average Number of Credits Earned in Foreign Languages



Females tended to earn more credits than males in first, second, and third year languages (Table III.9). This pattern did not change over time. Likewise, racial/ethnic distributions did not change significantly over time in the number of credits earned in first, second, or third year languages. Asians consistently earned more credits than any other racial/ethnic group.[24] White students earned more credits than black, Hispanic, or Native American students. Native Americans earned the fewest credits.

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[24] The one exception to this was in 1969, when white students earned more first year language credits (0.85) than Asian students (0.78).

Table III.9

Average Number of Course Credits Earned by High School Graduates in Foreign Languages, 1969 to 1987: Sex and Race/Ethnicity

	Foreign Lang Year 1 Credits	Foreign Lang Year 2 Credits	Foreign Lang Year 3 or More Credits	French Credits	Spanish Credits	Latin Credits	German Credits
1969							
Male	0.72	0.46	0.20	0.42	0.57	0.17	0.19
Female	0.85	0.58	0.34	0.76	0.64	0.19	0.14
Asian	0.78	0.71	0.61	0.92	0.63	0.06	0.49
Black	0.53	0.29	0.13	0.34	0.53	0.04	0.04
Hispanic	0.51	0.32	0.23	0.19	0.81	*	0.07
White	0.85	0.57	0.29	0.65	0.62	0.22	0.18
Other/Unknown	0.59	0.42	0.22	0.35	0.49	0.15	0.24
1975-1978							
Male	0.47	0.30	0.14	0.22	0.50	0.06	0.15
Female	0.60	0.38	0.24	0.44	0.60	0.05	0.14
Black	0.39	0.21	0.04	0.21	0.40	0.02	0.01
Hispanic	0.64	0.34	0.21	0.19	0.96	0.04	0.04
Non-Blk/Hisp	0.55	0.36	0.22	0.36	0.55	0.06	0.17
1979-1982							
Male	0.41	0.24	0.13	0.17	0.45	0.04	0.15
Female	0.50	0.30	0.18	0.36	0.49	0.04	0.10
Black	0.37	0.15	0.05	0.16	0.38	0.02	0.02
Hispanic	0.58	0.30	0.16	0.19	0.83	0.02	*
Non-Blk/Hisp	0.47	0.29	0.17	0.29	0.47	0.04	0.15
1982							
Male	0.41	0.24	0.13	0.21	0.42	0.04	0.08
Female	0.55	0.35	0.24	0.36	0.59	0.06	0.10
Asian	0.96	0.54	0.37	0.55	0.73	0.07	0.18
Black	0.43	0.20	0.08	0.19	0.43	0.06	0.01
Hispanic	0.43	0.20	0.12	0.12	0.55	0.01	0.02
Nat Am	0.25	0.13	0.05	0.13	0.21	0.01	0.06
White	0.49	0.32	0.21	0.33	0.51	0.05	0.11
1987							
Male	0.55	0.37	0.14	0.30	0.60	0.06	0.12
Female	0.72	0.48	0.20	0.51	0.79	0.07	0.09
Asian	0.86	0.63	0.31	0.65	0.99	0.09	0.14
Black	0.55	0.34	0.12	0.29	0.68	0.04	0.04
Hispanic	0.63	0.38	0.13	0.22	0.82	0.02	0.02
Native Am	0.47	0.20	0.05	0.17	0.51	*	0.05
White	0.65	0.44	0.17	0.43	0.68	0.08	0.12

* < 0.01 credits

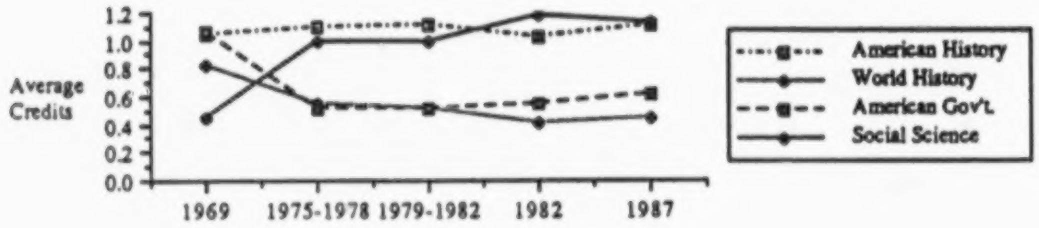
The patterns observed for the individual languages were generally the same as those seen for languages according to year. Females tended to earn more credits than males in Spanish and French (the languages with the greatest participation), approximately the same number in Latin, and slightly fewer than males in German. Asians, again, tended to earn more credits in all languages. The exception to this was Spanish, where Hispanic students earned more credits in the 1969 cohort.[25] In every cohort more students took Spanish than any other language followed by French, German, and Latin (Table III.6). There were very few credits earned in ESL courses until 1987. Less than one percent of the students participated from 1969 to 1982. In 1987, there was approximately two percent participation, primarily by Asians and Hispanics.

Social Studies

Social studies, which included American History, World History, American Government, and Social Science, was the most evenly distributed subject area according to gender and race/ethnicity (Table III.10). However, the number of credits earned in the various subject areas changed over time (Figure III.11). Credits earned in World History and American Government were highest in 1969, dropped to a low between 1979 and 1982, and rose slightly in 1987. By contrast, the number of credits earned in Social Science was lowest in 1969 and highest in 1982, dropping slightly in 1987. The number of credits earned in American History changed very little over time.

Figure III.11

Average Number of Credits Earned in Social Studies



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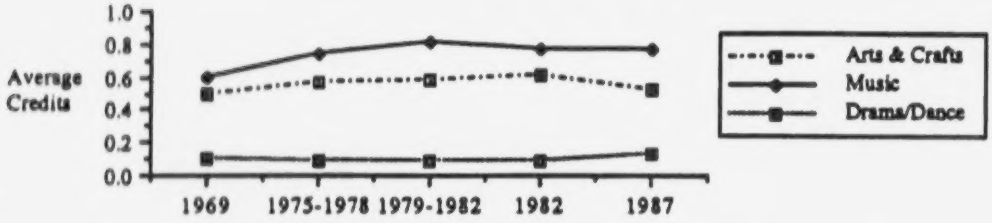
[25] Hispanics students earned the most credits in Spanish in 1975-1978 and 1979-1982. However, Asians were not represented separately.

Figure III.12

Average Number of Credits Earned in Fine Arts



Fine Arts

After 1969, when the number of credits earned in fine arts was lowest, there was very little change in the number of credits earned (Figure III.12). The area with the greatest participation (Table III.6) was Arts and Crafts (35 to 45 percent) followed by Music (35 to 36 percent) and Drama/Dance (8 to 12 percent).

Arts and Crafts was the only subject area that decreased between 1982 and 1987 (from 0.61 to 0.52 credits). This change was accompanied by a decrease in participation (from 45 to 41 percent). By contrast, the area of Drama/Dance showed an increase in credits earned from 0.08 to 0.13, as well as an increase in participation. The number of credits earned (and participation) in Music remained relatively uniform between 1975 and 1987.

Females generally took more credits than males in all subject areas (Table III.10). The one exception to this was for Arts and Crafts in 1987 when males earned 0.56 credits compared to 0.48 credits for females. Hispanic students and (in 1982 and 1987) Native Americans tended to take more Arts and Crafts than the other racial/ethnic groups, while white students generally took more music and drama/dance.

Summary

Enrollment changes in the academic curriculum were evaluated by comparing the average number of credits within a given area of study over time. In most cases, changes in the average number of credits earned reflected proportional changes in participation.

Table III.10

Average Number of Course Credits Earned by High School Graduates in Social Studies and Fine Arts, 1969 to 1987: Sex and Race/Ethnicity

SOCIAL STUDIES					FINE ARTS		
	Am Hist Credits	World Hist Credits	Am Govt Credits	Soc Sci Credits	Arts & Crafts Credits	Avg Music Credits	Avg Drama/ Dance Credits
1969							
Male	1.06	0.79	1.06	0.45	0.43	0.51	0.05
Female	1.04	0.84	1.08	0.46	0.52	0.66	0.13
Asian	1.01	0.99	0.90	0.29	0.49	0.36	0.18
Black	0.98	0.94	1.09	0.24	0.49	0.63	0.19
Hispanic	1.02	0.99	0.88	0.08	0.98	0.44	0.26
White	1.07	0.78	1.07	0.52	0.47	0.59	0.07
Other/Unknown	1.00	0.88	1.12	0.51	0.64	0.60	0.03
1975-1978							
Male	1.11	0.56	0.52	1.00	0.50	0.57	0.07
Female	1.09	0.53	0.50	1.01	0.62	0.89	0.11
Black	1.13	0.60	0.55	0.94	0.54	0.61	0.08
Hispanic	1.08	0.56	0.58	0.92	0.82	0.50	0.05
Non-Blk/Hisp	1.10	0.53	0.50	1.02	0.56	0.77	0.09
1979-1982							
Male	1.11	0.53	0.51	0.99	0.56	0.64	0.08
Female	1.10	0.51	0.50	0.99	0.60	0.97	0.10
Black	1.10	0.58	0.60	0.94	0.52	0.66	0.07
Hispanic	1.10	0.51	0.56	0.91	0.69	0.57	0.06
Non-Blk/Hisp	1.11	0.51	0.49	1.00	0.58	0.85	0.09
1982							
Male	1.04	0.41	0.55	1.16	0.61	0.62	0.05
Female	1.02	0.42	0.53	1.21	0.60	0.91	0.11
Asian	1.01	0.47	0.58	1.11	0.67	0.60	0.05
Black	1.06	0.44	0.54	1.07	0.56	0.63	0.06
Hispanic	1.01	0.41	0.56	1.02	0.65	0.57	0.08
Nat Am	1.16	0.52	0.40	1.15	0.83	0.81	0.05
White	1.03	0.40	0.54	1.23	0.60	0.83	0.08
1987							
Male	1.11	0.46	0.62	1.10	0.56	0.60	0.08
Female	1.12	0.45	0.62	1.15	0.48	0.93	0.19
Asian	1.16	0.60	0.61	1.09	0.57	0.44	0.15
Black	1.09	0.51	0.66	1.06	0.43	0.62	0.13
Hispanic	1.10	0.49	0.60	1.00	0.68	0.51	0.14
Native Am	1.42	0.41	0.68	0.68	0.89	0.71	0.09
White	1.13	0.43	0.62	1.10	0.51	0.85	0.13

Overall, students tended to earn a relatively high number of academic credits in 1969; the number of credits earned then declined in the intervening cohorts to a low in 1979-1982, began to increase again in 1982, and was highest in 1987. The biggest increase in the average number of credits earned occurred between 1982 and 1987, especially in the fields of math and science. The courses contributing most heavily to this increase tended to be more advanced or "core" courses. For example, the math courses with the biggest increases in credits earned were Geometry and Advanced Math. (Advanced Math includes such courses as Algebra II and III, Trigonometry, and Statistics.) Likewise, in science, Biology and Chemistry showed the most significant increases in credits earned between 1982 and 1987.

The academic fields including math, science, English, social studies, and Foreign Languages followed the same pattern as that observed for all academic credits. However, in English, social studies, and foreign languages, the number of credits earned in 1987 was less than than the number earned in 1969. Fine arts was an exception to the pattern: the lowest number of credits earned was in 1969, increasing in 1975-1978, and then remaining relatively uniform in the remainder of the cohorts,

The changes over time in the total number of credits earned by males and females, were similar to the pattern observed for the whole student population. However, females tended to earn more academic credits than males, a difference that increased over time. In math and science, where males tended to earn more credits than females in the earlier cohorts, the number of credits earned by males and females converged over time. There were few differences between males and females in the number of credits earned in English and social studies. In fine arts and foreign languages, females consistently earned more credits than males.

There were obvious differences observed in the number of academic credits earned according to race/ethnicity. Asian students consistently earned more academic credits than any other racial/ethnic group, a difference that increased over time. White students tended to earn more academic credits than black, Hispanic, or Native American students. All racial/ethnic groups except Hispanics, followed the same pattern of change (to different degrees) as the whole population (i.e. high number of credits earned in 1969 followed by a decrease in the intervening cohorts, and increasing in 1982 and 1987). Unlike the other racial/ethnic groups, the number of credits earned by Hispanic students increased between the 1969 and 1975-1978 cohorts and was lowest in 1982. This decline was then followed by a dramatic increase in credits earned between 1982 and 1987.

CHAPTER IV

TRENDS IN SECONDARY VOCATIONAL ENROLLMENTS

Participation in vocational education was almost universal among high school graduates in the years between 1969 and 1987. Approximately 92 percent of 1969 public high school graduates participated in the vocational curriculum, but this was the lowest level of participation between 1969 and 1987. By 1975 the fraction of students participating had increased to 97 percent, and at least 97 percent of high school graduates from each class participated in vocational education between 1975-78 and 1987. Furthermore, participation was strong among all groups within the high school graduate population, whether one examines participation by sex, by race and ethnicity, by parents' education, or by the students' high school grade average.

For some students, participation in the vocational curriculum was limited to a typing class (which was categorized as a general labor market skill). Most students, however, participated in the vocational curriculum to a much greater extent, perhaps taking auto mechanics courses, computer programming, or courses in home management. The vocational curriculum offers practical training in life skills and employment skills, it provides students with the opportunity to apply concepts they have learned in their academic courses, and it gives students a chance to explore alternative career options. As such, the vocational curriculum has been integrated into the average high school graduate's program, and while there does seem to be a tradeoff between vocational and academic course taking, vocational and academic education do not seem to be direct substitutes. Students continued to participate in the vocational curriculum even at a time when increasing academic requirements meant that they would have to stay in school longer each day. Thus, while there does seem to be some substitution of academic for vocational credits, the average student took more credits overall rather than cut back on vocational education.

General Trends in the Vocational Curriculum

The average number of credits completed in vocational education by high school graduates increased from 3.67 in 1969 to a twenty-year high of 4.89 in 1979-82.[26] The average number of credits earned in vocational education then declined to 4.44 in 1987 (Table IV.1). The decline in the average number of vocational credits after 1982 coincided with general increases in the total number of academic credits completed by high school graduates, although the declines in vocational education were much smaller than the increases in academic education. Furthermore, the decline in the average number of vocational credits completed by high school graduates between 1979-82 and 1987 was much smaller than the initial increase in average credits between 1969 and 1979-82. Taking the period 1969 to 1987 as a whole, then, increases in the average number of vocational credits accounted for about one-fourth of the total increase in credits completed in high school.

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[26] This is probably a high estimate of the total number of credits completed in vocational education. Because several courses that were classified in the personal/other curriculum in the other taxonomies were aggregated with vocational courses in the NLS-Youth data, they had to be included in the vocational curriculum in the NLS-Youth taxonomy. We estimate that the vocational credit totals in the NLS-Youth data set are between 0.15

Patterns of participation in vocational education for both male and female high school graduates followed the general trends of increasing and then decreasing average vocational credits between 1969 and 1987. However, the strength of this general pattern differed by sex, as the increase in average vocational credits earned by females was less than the increase for males, and the decline in average credits was steeper for females than was the decline in average vocational credits for males. Thus, in 1969, females took an average of 3.92 credits in vocational education, while males took an average of 3.37 credits in the vocational curriculum. This difference is equivalent to a full semester course. By 1987, males completed 4.52 credits in vocational education on average, while females completed an average of 4.36 credits. The total number of credits taken by males and by females peaked in 1979-82, but since then the average number of credits taken by females dropped by 0.74 credits, while the average number of credits completed by males declined only 0.25 credits.[27]

Patterns of participation in vocational education differed substantially by students' racial and ethnic characteristics. The pattern of vocational course taking among white students was similar to the pattern for all students. Between 1969 and 1979-82, the average number of credits completed in vocational education increased among white students from 3.38 credits to 4.91 credits, declining thereafter to 4.52 in 1987.

In contrast to the general pattern, Hispanics and blacks completed between 4.7 and 5.3 vocational credits in each year shown between 1969 and 1982. Between 1982 and 1987, however, the average number of vocational credits completed declined slightly among blacks,

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and 0.20 credits too high because of this discrepancy.

[27] The difference in the number of credits completed by males and females in vocational education in 1987 was not statistically significant. However, the trend was consistent from year to year and is therefore suggestive of a change in patterns of course taking.

Table IV.1
Average Credits Completed by High School Graduates in Vocational Education between 1969 and 1987 by Selected Characteristics

	1969	1975-1978	1979-1982	1982	1987
Total	3.67	4.50	4.89	4.64	4.44
Sex					
Male	3.37	4.34	4.77	4.63	4.52
Female	3.92	4.64	5.00	4.66	4.36
Race/Ethnicity[28]					
Asian	3.77	-	-	3.14	2.92
Black	4.76	4.66	4.78	4.83	4.47
Hispanic	5.10	4.69	4.87	5.27	4.29
Native Amer.	-	-	-	5.11	4.70
White	3.38	4.47	4.91	4.54	4.52
HS GPA					
Mostly As	1.76	3.40	3.79	3.83	2.77
Mostly Bs	3.30	4.44	4.59	4.94	3.90
Mostly Cs	4.29	5.04	5.44	5.24	4.78
Below C	4.37	5.33	5.72	5.19	4.83
Father's Education					
LT High School	4.54	5.46	5.67	5.49	-
High School Only	3.76	5.03	5.39	5.05	-
Some College	2.78	3.85	4.49	4.09	-
4 Years College	2.03	2.99	3.47	3.05	-
Advanced Degree	2.57	2.46	2.75	2.90	-
Grade Level					
9th Grade	0.57	0.68	0.71	0.71	0.58
10th Grade	0.82	0.92	0.99	0.95	0.74
11th Grade	1.17	1.34	1.46	1.38	1.06
12th Grade	1.12	1.54	1.72	1.59	1.32
Grade Unknown	-	0.02	0.01	0.01	0.74

Father's education not available for 1987.

from 4.83 to 4.47, and quite substantially among Hispanics, from 5.27 to 4.29. Thus, in contrast to the general pattern, these graduates actually completed fewer vocational credits on average in 1987 than they had in 1969. Like blacks and Hispanics, Asians also completed fewer credits in vocational education in 1987 than they had in 1969 (2.92 versus 3.77); unlike these other groups, who completed approximately the same credits in each year between 1969 and 1982, the average number of vocational credits completed by Asians appears to have consistently declined between 1969 and 1987.

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[28] White and Asian students were combined in the NLS-Youth data set (1975-78, 1979-82). Since Asians accounted for only about 3 percent of the population of high school graduates in these years, they were included in the white category in 1975-78 and 1979-82. This could bias the estimates of vocational course-taking for whites downward, but the bias would be very small because of the relative sizes of the Asian and white populations. Native American students were only represented in the 1982 and 1987 cohorts. Black and Hispanic students were represented in every cohort, although the criteria used for identifying them differed slightly from one data set to another. See Appendix 1 for a detailed description of the classification rules.

These different patterns of participation in the vocational curriculum over time produced different patterns of participation across racial/ethnic groups within any given year. For example, whites completed the fewest vocational credits on average in 1969, and Hispanics completed the most. Asians completed more vocational credits in 1969 than whites, but fewer than either blacks or Hispanics. By 1982, whites and Asians had switched their rankings, with Asians taking the fewest vocational credits; Hispanics continued to take more vocational education than the members of any other racial/ethnic group. Asians took even less vocational education in 1987 than in 1982, but Hispanics had replaced whites as the group taking the next fewest number of vocational credits; in 1987, whites, blacks and Native Americans completed approximately the same number of vocational credits.

The average amount of vocational education taken by high school graduates was inversely related to their grade average: as grades went up, the average amount of vocational education went down. This pattern was consistent from one year to the next. However, while the inverse relationship between grades and average vocational credits was persistent from year to year, the magnitude of the difference in vocational credits between students with high and low grade averages declined sharply after 1969. In 1969 students who earned mostly A's completed an average 1.76 vocational credits, while students with less than a C average completed 4.37 vocational credits, or almost 2.5 times as many credits in the vocational curriculum as A students. By 1979-82, this ratio had declined to only 1.5 (5.72/3.79), although by 1987 the ratio had crept back upward to 1.7 (4.83/2.77). Hence, between 1969 and 1987, students with higher achievement increased their participation in vocational education both in absolute terms and in relation to students with lower achievement in high school.

As with high school GPA, there was an inverse relationship between the amount of vocational education completed by high school graduates and the amount of education completed by their fathers. This relationship was consistent from one year to the next, even though the average number of credits completed by students whose fathers had equivalent levels of education increased over time. For example, students whose fathers had completed an advanced degree took an average of 2.57 credits in 1969 and 2.90 in 1982, and students whose fathers had not completed high school took an average of 4.54 credits in 1969 and 5.49 in 1982. Thus, there were two simultaneous patterns of course taking among students by their father's education: first, among those whose fathers had an equivalent amount of education there was a tendency to take increasing amounts of vocational education over time, and second, students whose fathers had higher educational achievement took less vocational education than those whose fathers had lower levels of educational achievement.

Table IV.1 shows that high school graduates completed most of their vocational credits as juniors and seniors, and that this pattern was consistent year after year. Graduates completed slightly more than one semester of vocational education on average in the ninth grade, and slightly less than two semesters of vocational education on average in the tenth grade.[29] As juniors, graduates took between two and three semester-length courses in vocational subjects, and, except for 1969, they completed an average of three semesters in vocational education as seniors.

Distribution of Credits Across the Vocational Sub-Curricula

There are three sub-curricula within the vocational curriculum: Consumer and Homemaking Economics (CHE), General Labor Market Preparation (GLMP), and Specific Labor Market Preparation (SLMP). The CHE curriculum includes courses which provide training in homemaking skills such as meal preparation, family budgeting, child development, personal hygiene, and sewing. The GLMP curriculum includes courses that provide students with basic labor market skills such as typing, or they provide an introduction to vocational careers such as career exploration or introductory industrial arts. In addition, general work experience is included in this curriculum. The SLMP curriculum includes all occupationally specific training programs such as business, health, or trades and industry. Cooperative education and specific work experience courses are included in the SLMP curriculum. This section explores changes in the distribution of credits across these three sub-curricula.

Between 1969 and 1987 the average number of credits completed by high school graduates in vocational education increased in the CHE and SLMP curricula, while the average number of credits completed in the GLMP curriculum declined (Table IV.2). Most of the increase in total vocational credits occurred in the SLMP curriculum: the average number of credits completed increased from 2.10 in 1969 to 2.90 in 1987, an increase of 38 percent. Average credits in the C&HE curriculum increased from 0.48 to 0.60 between 1969 and 1987, an increase of 25 percent. Average credits completed in the GLMP curriculum fell by 15 percent, from 1.10 in 1969 to 0.93 in 1987.

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[29] Since credits are measured in Carnegie units, half of a credit is equivalent to a semester-length course.

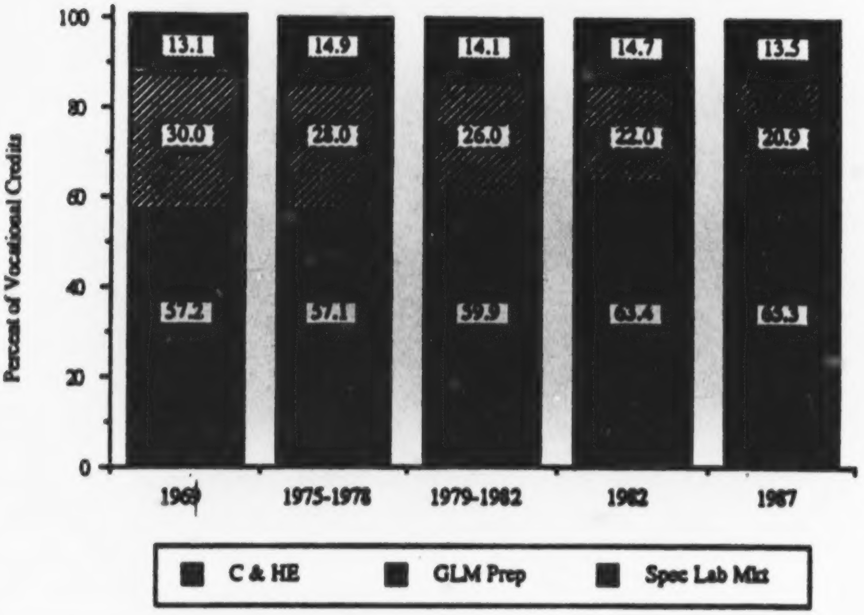
Table IV.2
Average Credits Completed in Vocational Education and in the Vocational Sub-Curricula

	Total Voc. Cred.	C&HE	GLMP	SLMP
1969	3.67	0.48	1.10	2.10
1975-78	4.50	0.67	1.26	2.57
1979-82	4.89	0.69	1.27	2.93
1982	4.64	0.68	1.02	2.94
1987	4.44	0.60	0.93	2.90

Since 1969 high school graduates have completed an increasing proportion of their vocational education credits from the specific labor market preparation curriculum. In 1969 courses completed in the SLMP curriculum accounted for an average of 57 percent of all vocational credits; this percentage had risen to 65 percent on average in 1987 (Figure IV.1). In contrast, the average percentage of credits completed in the GLMP curriculum declined from 30 percent in 1969 to 21 percent in 1987. The average percentage of credits completed in CHE fluctuated between 13 and 15 percent of all vocational credits. The percentage decline in the proportion of credits accounted for by the GLMP curriculum was offset almost entirely by the percentage increase in the proportion of credits accounted for by the SLMP curriculum. The reason for this trend away from general labor market courses and toward specific labor market courses is not clear. Yet students have increasingly opted to take introductory level courses within specific labor market fields rather than general courses in the general labor market preparation curriculum.

The remainder of this chapter examines participation in the subcurricula in greater detail. However, this section only looks at patterns of course taking in each of the curricula by all students generally and among students by race and ethnicity. Course-taking patterns in vocational education by gender, parents' education, and high school grade point average will be examined in Chapter 5, which looks at participation in vocational education in relation to federal policy goals of increased access for students with special educational needs.

Figure IV.1
Average Percentage of Credits Completed in the C&HE, GLMP, and SLMP Curricula



Participation in the Consumer and Homemaking Economics Curriculum

The average number of credits completed by all students in the CHE curriculum increased between 1969 and 1975-78, and then remained relatively stable until declining slightly between 1982 and 1987 (Table IV.3). The increase in average credits, however, reflects the increasing proportion of graduates who participated in this subcurriculum. In 1969, only 32 percent of high school graduates took courses in the C&HE curriculum; by 1975-78, the fraction of graduates participating had increased to 49 percent. Rates of participation held steady at about 50 percent between 1975-78 and 1982, and then dropped to 47 percent in 1987. While the average credits taken by all students increased after 1969, the average number of credits completed by those participating in C&HE actually dropped after 1969 when the rates of participation are taken into account: the average participant completed 1.51 credits in 1969, 1.33 in 1979-82, and 1.27 in 1987. The difference in average credits completed by participants in 1979-82 and 1987 is not statistically significant, so one cannot say whether average credits completed by participants continued to decline or leveled off after the initial decline between 1969 and 1975-78.

Participation in the C&HE curriculum varied somewhat along racial and ethnic lines (Table IV.4). Blacks consistently completed more credits than the members of other groups,

Table IV.3
Participation in the C&HE Curriculum

	Average C&HE Credits	Percent of Students Participating	Average Credits if Participating
1969	0.48	31.76%	1.51
1975-78	0.67	48.61	1.38
1979-82	0.69	51.80	1.33
1982	0.68	50.19	1.35
1987	0.60	47.18	1.27

and Asians consistently completed the fewest. The number of credits completed by blacks and Hispanics fluctuated from year to year with no clear patterns emerging. Whites exhibited the most stable pattern of participation with only small fluctuations in the number of credits completed after 1975-78. In contrast to these other groups, Asians completed more credits on average in each succeeding year. This is not only in contrast to the other groups, but it is also an exception to the general pattern of declining average participation in vocational education by Asians.

Table IV.4
Participation in C&HE by Selected Characteristics

	1969	1975-1978	1979-1982	1982	1987
Race/Ethnicity[30]					
Asian	0.22	–	–	0.29	0.35
Black	0.70	0.96	0.86	0.92	0.73
Hispanic	0.42	0.77	0.59	0.87	0.61
White	0.44	0.62	0.66	0.63	0.60

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[30] White and Asian students were combined in the NLS-Youth data set (1975-78, 1979-82). Since Asians accounted for only about 3 percent of the population of high school graduates in these years, they were included in the white category in 1975-78 and 1979-82. This could bias the estimates of vocational course-taking for whites downward, but the bias would be very small because of the relative sizes of the Asian and white populations. Native American students were only represented in the 1982 and 1987 cohorts. Black and Hispanic students were represented in every cohort, although the criteria used for identifying them differed slightly from one data set to another.

Participation in the General Labor Market Preparation Curriculum

Between 1969 and 1987, the average number of credits completed by high school graduates in the GLMP curriculum declined from 1.10 to 0.93. The bulk of this decline was concentrated in career exploration courses, which fell from an average of 0.31 credits in 1969 to just 0.14 credits in 1987.[31] In contrast, the number of credits earned in typing was constant from year to year at about 0.55 credits (Table IV.5).

Patterns of participation in the general labor market preparation curriculum differed substantially by race and ethnicity. The average number of credits earned by Asians, blacks, and Hispanics in GLMP courses dropped rapidly between 1969 and 1982, and almost all of these declines were in the career exploration area. The average number of credits completed by whites in GLMP courses, in contrast, was relatively steady between 1969 and 1987. The average number of credits completed in typing dropped among graduates from all racial and ethnic groups between 1969 and 1987, except among whites, who experienced small increases in the average number of typing credits during this period. In both typing and career exploration, students from minority backgrounds were more similar to each other than to whites. In the introductory industrial arts area, the average number of credits taken increased between 1969 and 1982 for all racial and ethnic groups, although the increase was not statistically significant among whites. In general, the patterns of course taking by different racial and ethnic groups became more similar over time, although blacks and Hispanics continued to take more credits in career exploration than whites or Asians, and Asians completed fewer credits in introductory industrial arts than the members of other racial or ethnic groups.

Participation in the Specific Labor Market Preparation Curriculum

The SLMP curriculum includes all of the courses that are related to specific occupational training. Participation in this curriculum will be examined in two different ways: by vocational

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[31] The apparent increase in total GLMP and in career exploration credits in 1975-78 and 1979-82 is probably an artifact of the data: several courses that were included in the personal use curriculum in the ETS, HS&B, and NAEP taxonomies had been aggregated with career exploration courses as a single course number in the original NLS-Youth data. Therefore, since we had to assign this course number either to career exploration or to personal use, there would have been a discrepancy in credit estimates one way or the other. The majority of courses assigned to this number were career exploration courses, so it was included in the GLMP curriculum. This aggregation of courses to a single course number resulted in an estimate of career exploration credits that was about 0.15 to 0.20 credits too high and an estimate of personal use credits that was low by this amount in 1975-78 and 1979-82.

Table IV.5
Average Credits Completed in the GLMP Curriculum

	Total GLMP Cred.	Typing	Intro Industrial	Career Exploration	GLM Skills
All Students					
1969	1.10	0.54	0.12	0.31	0.13
1975-78	1.26	0.56	0.17	0.38	0.15
1979-82	1.27	0.55	0.16	0.41	0.16
1982	1.02	0.55	0.17	0.17	0.12
1987	0.93	0.55	0.14	0.14	0.10
Race/Ethnicity					
Asian					
1969	1.55	0.65	*	0.80	0.10
1982	0.92	0.50	0.11	0.25	0.06
1987	0.71	0.51	0.04	0.11	0.05
Black					
1969	1.55	0.63	0.04	0.74	0.14
1975-78	1.23†	0.52	0.11	0.36	0.23
1979-82	1.32†	0.50	0.11	0.48	0.24
1982	1.04	0.55	0.13	0.26	0.11
1987	0.98	0.52	0.13	0.20	0.12
Hispanic					
1969	1.90	0.64	0.01	1.09	0.15
1975-78	1.46†	0.61	0.10	0.63	0.13
1979-82	1.61†	0.57	0.10	0.83	0.11
1982	1.15	0.50	0.25	0.27	0.13
1987	0.98	0.56	0.11	0.25	0.05
White					
1969	0.95	0.51	0.14	0.17	0.13
1975-78	1.26†	0.57	0.18	0.37	0.14
1979-82	1.24†	0.56	0.17	0.37	0.14
1982	0.99	0.56	0.17	0.14	0.12
1987	0.94	0.57	0.15	0.12	0.10

* Less than 0.01 credits.
† See footnote 5.

field (e.g. business, trades and industry, or health), and by the level of sophistication of the various courses. Courses in the SLMP curriculum are generally arranged in sequences, with later courses in a sequence building on the previous course work. Each way of examining participation in the SLMP curriculum yields different insights into the vocational education experiences of high school graduates over time.

Between 1969 and 1987, the average number of credits completed by high school graduates in the SLMP curriculum increased from 2.10 to 2.90. Table IV.6 shows that

Table IV.6
Average Number of Credits Completed in Specific Labor Market Preparation Subjects

	Total SLMP Credits	Agri-culture Credits	All Business Credits	Market/ Distrib. Credits	Health Credits	Occ. Home Econ. Credits	All T & I Credits	Tech./ Comm. Credits
1969	2.10	0.06	0.94	0.05	*	0.08	0.95	*
1975-78	2.57	0.15	0.95	0.13	0.04	0.12	0.99	0.09
1979-82	2.93	0.22	0.96	0.20	0.06	0.15	1.18	0.08
1982	2.94	0.21	1.03	0.16	0.05	0.17	1.07	0.11
1987	2.90	0.19	0.97	0.16	0.07	0.19	0.96	0.24

* Less than 0.01 credits.

increases in the average number of credits completed by high school graduates were not concentrated in one or two fields, but were spread across most of the seven vocational fields. For example, between 1969 and 1987, average credits earned in agriculture increased from 0.06 to 0.19, in health from virtually zero to 0.07, in marketing from 0.05 to 0.16, in occupational home economics from 0.08 to 0.19, and in technical and communications from almost none to 0.24. With the exception of technical and communications, increases in the average number of credits taken occurred between 1969 and 1982; in technical and communications, however, the average number of credits taken jumped from 0.11 to 0.24 between 1982 and 1987. The technical and communications field includes computer programming and computer sciences.

In contrast to these widespread increases, the average number of credits earned in business (both management and support) were unchanged from year to year, and, overall, the trades and industry (T&I) fields accounted for about the same number of credits on average in 1987 as they did in 1969 (Table IV.7). However, while total T&I was unchanged, the separate T&I fields fared differently: average enrollments increased in both construction and mechanics programs, but these gains were offset by declines in precision production.

Table IV.8 shows that changes in patterns of participation in the SLMP curriculum were not strongly associated with the race or ethnicity of high school graduates. To the extent that patterns can be generalized, they seem to encompass all students, regardless of their racial or ethnic characteristics. For example, the average number of credits completed in the technical and communications field increased among all high school graduates between 1969 and 1987, although Asians and whites tended to take more credits in this area than blacks or Hispanics.

Table IV.7
Average Credits Completed in Business and Trades and Industry

	Business Management	Business Support	T&I Construction	T&I Mechanics/ Repairers	T&I Precision Production
1969	0.20	0.75	0.05	0.12	0.78
1975-78	0.22	0.73	0.11	0.23	0.63
1979-82	0.21	0.75	0.15	0.30	0.69
1982	0.22	0.81	0.13	0.26	0.67
1987	0.19	0.97	0.11	0.22	0.63

The increase in average credits in the technical and communications area should not be surprising, since all computer-related courses are included in this field. Similarly, the average number of credits completed in the health and occupational home economics fields increased among students from all racial and ethnic backgrounds. The average number of trade and industry credits completed declined among Asians, blacks, and Hispanics, but held steady for whites (whites completed fewer T&I credits to start with); likewise, the average number of business credits was relatively constant among all racial and ethnic groups except blacks, who experienced a steep decline in average business credits between 1969 and 1975-78 before leveling off.

Changes in patterns of participation in the SLMP curriculum seemed to encompass all students, and the average number of credits completed by members of the different racial or ethnic groups, with the exception of Asians, was similar in all fields. Asians, in contrast, completed fewer SLMP credits on average overall, and generally had lower rates of participation in the various vocational fields. Even this generalization must be qualified, however, since Asians completed the same number of credits as blacks, Hispanics, and whites in marketing and distribution and in health, and completed more credits on average in technical and communications than blacks and Hispanics.

Enrollment trends in each of the specific labor market fields is one way of describing participation in the SLMP curriculum. Another way of looking at participation in this curriculum is by the level, or degree of sophistication, of the course work that students completed. The average number of credits completed in the first course in a sequence,

Table IV.8
Participation in the Specific Labor Market Curriculum by Race/Ethnicity, 1969 to 1987

	Total SLMP Credits	Agri-culture Credits	All Business Credits	Market/ Distrib. Credits	Health Credits	Occ. Home Econ. Credits	All T & I Credits	Tech/ Comm. Credits
Asians								
1969	2.00	*	0.69	0.05	*	0.04	1.19	0.02
1982	1.94	0.05	0.59	0.04	0.03	0.05	0.88	0.16
1987	1.86	0.01	0.65	0.16	0.11	0.09	0.44	0.29
Black								
1969	2.51	0.01	1.27	0.07	*	0.04	1.11	*
1975-78	2.48	0.07	0.94	0.19	0.08	0.29	0.82	0.04
1979-82	2.59	0.12	0.86	0.20	0.06	0.28	0.94	0.04
1982	2.87	0.09	0.96	0.21	0.13	0.23	1.00	0.10
1987	2.77	0.10	0.99	0.17	0.12	0.26	0.75	0.16
Hispanic								
1969	2.78	0.03	0.95	0.10	*	0.01	1.67	0.03
1975-78	2.46	0.14	0.86	0.11	0.04	0.14	1.05	0.06
1979-82	2.66	0.13	1.03	0.18	0.03	0.10	1.06	0.07
1982	3.26	0.24	0.99	0.15	0.06	0.19	1.37	0.07
1987	2.71	0.06	0.98	0.16	0.08	0.17	0.98	0.13
White								
1969	1.99	0.08	0.87	0.05	*	0.09	0.89	*
1975-78	2.59	0.17	0.96	0.13	0.04	0.09	1.01	0.09
1979-82	3.01	0.24	0.98	0.20	0.06	0.13	1.23	0.09
1982	2.91	0.23	1.06	0.16	0.03	0.17	1.01	0.11
1987	2.99	0.24	0.98	0.15	0.07	0.18	1.01	0.26

* Less than 0.01 credits.

the second or later course in a sequence, or in specialty courses is shown in Table IV.9. Specialty courses generally are advanced and specialized topics within a subject area, although this category also included courses that could not be identified as sequential in the original data. In addition, a category labeled "First and/or Second" was necessary because the ETS and NLS-Youth data sets did not differentiate the level of course work in subject matter that was clearly identified as part of a sequence in the other data sets.

Table IV.9 shows that most of the SLMP credits were completed in the first course in a sequence, and that virtually all of the growth in SLMP credits occurred at the level of the first course. For example, graduates completed an average of 1.01 credits in a first course in 1969, and by 1987, they completed an average of 1.90. Thus, the average number of credits completed at the first course level increased by almost 90 percent. In contrast, the average number of credits completed in the second or later course in a sequence increased from 0.68 credits in 1969 to 0.80 credits in 1987, an increase of only 18 percent. In addition, the average number of credits completed in specialty areas declined from 0.36 credits to 0.20 credits. The increase in first-level courses is partially explained by the increase in the percentage of students participating in vocational education at that level, but increases in the rate of participation did not account for all of the growth at the level of the first course.

Table IV.9
Average Credits Completed and Percentage of Graduates Participating in the SLMP Curriculum by Level of Coursework

	Total SLMP	Courses in Sequence			Specialty
		First	Second or Later	First &/or Second	
		— Average Credits—			
1969	2.10	1.01	0.68	0.05	0.36
1975-78	2.57	1.50	0.48	0.28	0.31
1979-82	2.93	1.61	0.59	0.40	0.33
1982	2.94	1.77	0.92	-	0.26
1987	2.90	1.90	0.80	-	0.20
		— Percentage Participating —			
1969	72.34	61.29	37.99	4.77	31.70
1975-78	82.66	72.58	31.13	13.09	24.23
1979-82	85.38	75.61	36.84	17.03	25.18
1982	86.73	79.12	46.95	-	22.77
1987	88.52	83.19	42.89	-	20.49

Proximity and Intensity of Vocational Training

Several researchers have argued that the timing of vocational education is important, particularly for those who plan to enter the labor force immediately after high school.[32] According to this theory, the less elapsed time between, or the "proximity" of, vocational training and employment related to that training, the more the student is likely to remember and be able to apply on the job. Furthermore, in a time of rapidly changing technology, the less time between a student's training and his or her employment, the more current that student's knowledge of the technologies being used in the particular field will be.

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[32] For a more elaborate discussion on the timing of vocational education, see E. Gareth Hoachlander and Susan P. Choy, *High School and Beyond: Classifications of Secondary Vocational Education Courses and Students*, a report prepared for the National Center for Education Statistics (Washington, D.C.: U.S. Department of Education, November 1986), and Paul B. Campbell, Mollie N. Orth, and Patricia Seitz, *Patterns of Participation in Secondary Vocational Education* (Columbus, Ohio: National Center for Research in Vocational Education, July 1981).

The general trend between 1969 and 1987 appears to have been towards a greater percentage of senior year vocational course-work at the level of the first course, although there was no decline in the absolute amount of advanced vocational coursework taken in the junior and senior years by 1982 or 1987 graduates. In 1969, high school graduates completed an average of about three-quarters of a credit in the junior and in the senior years (Table IV.10).

Table IV.10
Average Credits Completed in the SLMP Curriculum by Level of Coursework and Grade Level

		Courses in Sequence			
	Total SLMP	First	Second or Later	First &/or Second	Specialty
1969					
9th Grade	0.20	0.17	*	0.01	0.02
10th Grade	0.39	0.29	0.04	*	0.05
11th Grade	0.77	0.37	0.31	0.01	0.09
12th Grade	0.75	0.18	0.32	0.02	0.22
1975-78					
9th Grade	0.23	0.18	0.01	0.01	0.03
10th Grade	0.42	0.25	0.07	0.04	0.05
11th Grade	0.88	0.51	0.16	0.11	0.10
12th Grade	1.03	0.54	0.25	0.12	0.12
1979-82					
9th Grade	0.27	0.21	0.02	0.02	0.03
10th Grade	0.50	0.29	0.09	0.06	0.06
11th Grade	1.00	0.53	0.19	0.17	0.11
12th Grade	1.17	0.59	0.29	0.16	0.13
1982					
9th Grade	0.29	0.24	0.02	-	0.02
10th Grade	0.49	0.35	0.10	-	0.04
11th Grade	0.99	0.61	0.30	-	0.08
12th Grade	1.15	0.55	0.49	-	0.11
1987					
9th Grade	0.23	0.20	0.01	-	0.01
10th Grade	0.38	0.27	0.09	-	0.02
11th Grade	0.79	0.56	0.18	-	0.05
12th Grade	1.01	0.55	0.38	-	0.08
Grade Unknown	0.49	0.32	0.14	-	0.04

* Less than 0.01 credits.

As juniors, graduates completed 0.37 credits in a first course (or 48 percent of their SLMP credits), 0.31 credits in a second or later course (40 percent), and 0.09 credits in the specialty area (12 percent). In the senior year the pattern had shifted even more toward the more advanced courses, with 0.18 credits in a first course (24 percent), 0.32 credits in a second or later course (42 percent), and 0.22 credits in a specialty course (34 percent). Because of the large number of credits that could not be categorized definitively as a first or as a second course, we could not easily draw comparisons between 1969 and 1975-78 or 1979-82. However, comparisons with 1982 show that a greater percentage of junior and senior year coursework was at the level of the first course in 1982 than in 1969. In 1982, juniors competed 0.61 credits in first-level courses (61 percent), 0.30 credits in second- or higher-level courses (30 percent), and .08 credits in the specialty area (8 percent). As seniors, 1982 graduates completed 0.55 credits (47 percent), 0.49 credits (43 percent), and 0.11 credits (10 percent) in the first, second or later, and specialty courses, respectively. Although difficult to compare because of the missing grade level information, the same pattern of course taking with respect to level seems to persist into 1987. Thus, 1982 and 1987 high school graduates do appear to be taking a greater percentage of their SLMP coursework at the introductory level than 1969 graduates, but there did not seem to be a corresponding decline in the fraction of SLMP credits completed in the more advanced levels. Rather, the declines appear to be in the specialty area.

The increase over time in the number of first-course specific labor market credits earned by high school graduates does not necessarily indicate that students are taking less advanced training in a single field. The ratio of first-course credits to second-course credits could increase, but the increase could mean that students are including more variety in their vocational programs without sacrificing depth in their primary field.[33] For purposes of determining a primary field, we included credits earned in specific labor market fields and in consumer and homemaking economics. Although the latter curriculum does not prepare students for paid employment, there are advanced courses in such specialties as clothing arts, food preparation, and child care.

Taking the number of credits completed in a single field as a measure of the intensity of vocational training, Table IV.11 shows the percentage distribution of students by the number of credits they completed in their primary field. According to Table IV.11, high school graduates participated in vocational education with the same or with greater intensity in 1987 as they did in 1969. In 1969, almost 46 percent of high school graduates completed fewer than two credits in their primary field; this fraction declined to less than 38 percent by 1987. Likewise, the fraction of students completing 2 or more credits in their primary field increased from 56 percent in 1969 to over 62 percent in 1987. So while students took more vocational education on average in the first course of a sequence between 1969 and 1987, the intensity of vocational training in the student's primary field also increased over time.

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[33] The primary field is defined as the field in which a student completed the most vocational credits. In the case of ties in the number of credits completed between two or more fields, students were randomly assigned to one field as their primary field.

Table IV.11
Percentage of Graduates Enrolled in Primary Vocational Fields by Number of Credits Completed, 1969 to 1987

	Number of Credits Completed							
	<2	2	3	4	5	6	7	8+
1969	45.6%	20.9%	13.8%	10.9%	3.1%	4.1%	1.4%	0.2%
1975-78	44.2	24.2	13.2	8.6	3.4	4.2	0.7	1.3
1979-82	35.8	24.0	16.8	9.5	5.0	6.0	1.7	1.3
1982	42.6	22.4	15.1	8.8	3.9	4.5	1.0	1.7
1987	37.6	24.9	15.9	10.1	3.8	5.0	1.3	1.4

Summary of Trends in Vocational Course Taking

Participation in the vocational curriculum by high school graduates was almost universal between 1969 and 1987. Approximately 92 percent of 1969 graduates took some vocational education, but this was the lowest level of participation during the years studied here: between 1975-78 and 1987, at least 97 percent of high school graduates participated in the vocational curriculum.

The average number of credits completed in vocational education by high school graduates increased rapidly between 1969 and 1975-78, peaked in 1979-82, and then declined slightly through 1987. The declines, however, were much smaller than the initial increases, so graduates completed more credits on average in 1987 than they did in 1969. This pattern of rapid increases and then modest declines in vocational participation were reflected in the patterns of participation by students with different characteristics, including sex, parent education, and student grade point average.

The magnitude of these trends, however, differed among various groups of students. For example, the average number of credits taken in vocational education increased more rapidly among males than among females between 1969 and 1979-82, and then declined less severely between 1979-82 and 1987 among males than among females. Hence, females completed more credits on average than males in vocational education in 1969, but by 1987, males completed more credits on average than females.

There were clear patterns of participation in vocational education among students by their parents' education and by their high school grade average. Students whose parents had completed more schooling tended to take fewer credits in vocational education than students whose parents had less education. Similarly, students with higher grades in high school took less vocational education than students with lower high school grades.

There was also a clear relationship between grade level and vocational education. Students completed vocational credits in each year enrolled, but the bulk of vocational credits were completed by students when they were juniors and seniors.

Most vocational education was taken in the specific labor market preparation curriculum, and this tendency increased over time. The increasing concentration of credits in the SLMP curriculum reflects both absolute increases in courses taken in this curriculum as well as absolute and relative declines in participation in the general labor market preparation curriculum. Most of the declines in the GLMP curriculum were in career exploration courses.

Increases in the SLMP curriculum were spread across all fields except business and trades and industry. Business and T&I enrollments were relatively constant throughout the period, and despite their lack of growth, they were the biggest vocational fields in terms of enrollments in each year between 1969 and 1987. The most pronounced growth in enrollments was in technical and communications fields, which include all computer-related programs.

Most growth within the SLMP curriculum was at the level of the first course in a sequence. However, this growth did not seem to result in absolute declines in the number of credits completed in the second or later course in a sequence. In general, increases at the first course level seemed to replace specialty courses. When we examined the depth of course-taking experiences in the students' primary vocational field, we found that the degree of concentration in vocational course taking actually increased by a small amount between 1969 and 1987.

CHAPTER V

ACCESS TO SECONDARY VOCATIONAL EDUCATION

The Carl Perkins Vocational Education Act has two primary objectives: first, to improve the quality of vocational education provided at all levels, and second, to ensure access to vocational education for a variety of special-needs populations.[34] Of the six special populations identified in the Act, three are generally served at the secondary level: students pursuing training in non-gender traditional fields, students who are economically or academically disadvantaged, and students with handicaps. Course enrollments for these subgroups offer some indication of whether or not these students are gaining more access to vocational education.[35] This chapter describes trends in vocational education for these three groups. The first part compares vocational enrollments for males and females in various specific labor market areas which have stereotypically been associated with just one group. The second part examines vocational enrollment trends for students who may have been either academically or economically disadvantaged. Finally, the last part compares the vocational enrollments of 1987 graduates who had some type of handicap to the enrollments of all high school graduates.

Access to Non-Traditional Occupational Preparation for Males and Females

Many vocational fields have been traditionally associated with one gender or the other. Business support services, consumer and homemaking economics, occupational home economics, and health have been perceived as occupational programs for females. In contrast, trades and industry and agriculture have been considered male occupations. One objective set forth in the Perkins Act was to encourage students to pursue occupational training in fields which are not traditionally identified with the students' gender.[36] This section examines participation among males and females in occupationally specific vocational education. The results of this study indicate that although gender equity has not yet been achieved in secondary vocational education, there has been some progress.

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[34] The six groups identified in the Perkins Act are handicapped individuals, disadvantaged individuals, individuals receiving training in non-traditional fields, single parents and homemakers, displaced adult workers, and prison inmates.

[35] Although vocational enrollments offer one manner of examining access, they do not fully measure access as defined by Perkins. For example, they do not reveal whether special needs groups are receiving the same quality of training provided to non-special needs students.

[36] Although the Perkins Act establishes sex equity as federal policy objective, earlier legislation also addressed gender equities in vocational education. Title II of the 1976 Education Act amendments had a number of requirements for states including the development of five-year plans for removing gender-bias from vocational education. See Louise Vetter, "Stability and Change in Enrollment of Girls and Young Women in Vocational Education: 1971-1980," *Youth & Society*, vol. 16 no. 3, March 1985, pp. 335-356 and Louise Vetter and Delina R. Hickey, "Where Women Are Enrolled," *Vocational Education Journal*, October 1985, pp. 26-29.

Males and females have been equally likely to enroll in vocational education courses and have generally earned similar numbers of credits (Table V.1). Both groups experienced a significant increase in the number of vocational credits earned on average by graduates in classes between 1969 and 1979-82. From 1979-82 to 1987 both groups experienced a decline in vocational enrollments, with the changes for females being slightly larger than the changes seen among males. By 1987 about 98 percent of both males and females participated in vocational education with males earning an average of 4.52 credits in vocational education, while females earned, on average, 4.36 credits. While there is parity at the most aggregate level, a closer examination of enrollments shows that males and females participated in different parts of the vocational curriculum during the period examined in this report.

Although there has been some improvement over time, enrollments in most vocational subjects were still dominated by one gender group in 1987. Consumer and Homemaking Economics (CHE), for example, is a vocational field that has been traditionally identified as female oriented. Although CHE continued to be a female dominated field in 1987, some progress has been made towards the gender equity goals identified by the Perkins Act. Enrollments in CHE by females have decreased, particularly between 1982 and 1987. In this period, CHE credits for females fell from 1.03 credits to 0.86 credits. From 1969 to 1987 enrollments by males experienced a sharp increase. In 1969 males earned, on average, 0.05 credits in CHE. By 1975-78 enrollments rose to an average of 0.21 credits. From 1975-78 to 1979-82 enrollments in CHE rose again to about 0.30 credits. Between 1979-82 and 1987 there were no significant changes in CHE credits for males.

Enrollments in general labor market preparation courses (GLMP) appear to have fluctuated between 1969 and 1987 (Table V.1). This table illustrates that total GLMP enrollments for both males and females increased in the seventies, then fell sharply in 1982 and 1987. Credits in GLMP subjects earned by females, for example, rose from 1.23 credits in 1969 to 1.40 in 1975-78. From 1975-78 to 1979-82 average credits remained close to 1.4 credits before falling to 1.07 credits in 1982. For 1987 there was another smaller decrease in the number of credits earned by females. Rather than reflecting actual changes in the course-taking patterns this instability may, to some extent, reflect coding differences in the different transcript studies.[37] The number of credits earned in career exploration in 1975-78 and 1979-82 were somewhat overstated, compared to other years.

Although the general enrollment patterns for males and females were similar, there were some differences. Except in the class of 1987, males completed significantly fewer GLMP credits than females. For example, in 1969 males completed 0.91 credits in GLMP courses while females completed 1.23 credits. More recently, the disparity between males and females has decreased. In 1987 males completed an average of 0.90 credits while females completed 0.95 credits. This change can, in some part, be attributed to a small decrease in credits completed in typing by females with a corresponding increase in the number of typing credits earned by males.

Table V.1
Average Number of Credits Earned by Public High School Graduates in CHE and GLMP Subjects by Sex
(1969-1987)

				General Labor Market Preparation				
	Total Voc Ed	Total Voc Ed Less CE	Consum HomeEc (CHE)	Total	Typing	Intro Indust	Career Exp	GLM Skills
Males								
1969	3.37	3.16	0.05	0.91	0.37	0.23	0.21	0.10
1975-1978	4.34	4.03	0.21	1.11	0.36	0.34	0.31	0.11
1979-1982	4.77	4.38	0.30	1.15	0.35	0.28	0.39	0.13
1982	4.63	4.44	0.31	0.96	0.37	0.31	0.19	0.09
1987	4.52	4.38	0.33	0.90	0.43	0.25	0.14	0.08
Females								
1969	3.92	3.56	0.88	1.23	0.70	0.01	0.36	0.16
1975-1978	4.64	4.19	1.06	1.40	0.74	0.02	0.45	0.19
1979-1982	5.00	4.58	1.07	1.38	0.74	0.04	0.42	0.18
1982	4.66	4.50	1.03	1.07	0.71	0.04	0.16	0.15
1987	4.36	4.22	0.86	0.95	0.66	0.03	0.14	0.12

Within the GLMP curriculum, males and females had different enrollment patterns. Throughout the time period shown, females earned significantly more credits in typing than males. For example, in 1975-78 males earned 0.36 credits in typing compared to 0.74 credits earned by females. In 1987 there was a small increase in the number of typing credits earned by males accompanied by a small decrease for females. Enrollments in introductory industrial arts courses were largely dominated by males. In each year presented in Table V.1, males completed about one-quarter of a credit in industrial arts. In comparison, females completed virtually no credits in the same subject area. Enrollment trends in career exploration courses were similar, although females had significantly higher enrollments in career exploration than males in 1969. Between 1969 and 1987, the average number of credits earned by both groups declined; with the decline in female enrollments somewhat larger. By 1987 males enrolled in career exploration courses at the same rate as females; both groups earned, on average, 0.14 credits in career exploration. Overall, females completed slightly more credits in general labor market skill courses than males. While the differences within each year were statistically significant, the differences were quite small.

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[37] To some extent, increases in GLMP enrollments for 1975-78 and 1979-82 may reflect differences in the manner that different transcript studies collected course information. The NLS-Youth transcript study aggregated many courses which the Secondary School Taxonomy divided between career exploration and the personal and other use curriculum. For more information, see the technical notes at the end of this report.

In 1987 females were less likely than males to have enrolled in specific labor market preparation (SLMP) courses. Ninety-one percent of all males, compared to 86 percent of all females completed at least one class in the SLMP curriculum. This disparity was also reflected in the number of credits earned by males and females, 3.29 versus 2.55 credits. This difference reflects differences which persisted in each of the five periods observed in Table V.2. For both

Table V.2
Average Number of Credits Earned by Public High School Graduates in Different SLMP Subjects by Sex (1969-1987)

	All SLMP	Agric	Bus Mgmt	Bus Sup	Mktg/ Dist	Health	OHE	Const	Mech & Rep	Prec Prod	Tech/ Comm
Males											
1969	2.41	0.12	0.18	0.21	0.04	*	0.04	0.09	0.24	1.48	*
1975-1978	3.02	0.26	0.20	0.21	0.15	0.01	0.05	0.23	0.45	1.19	0.11
1979-1982	3.33	0.35	0.18	0.22	0.17	0.01	0.06	0.30	0.59	1.21	0.09
1982	3.36	0.36	0.18	0.29	0.14	0.02	0.05	0.27	0.52	1.20	0.14
1987	3.29	0.33	0.16	0.41	0.13	0.02	0.08	0.21	0.43	1.09	0.29
Females											
1969	1.81	0.02	0.21	1.26	0.06	0.01	0.12	*	0.01	0.12	*
1975-1978	2.18	0.06	0.24	1.19	0.12	0.08	0.17	*	0.03	0.13	0.07
1979-1982	2.55	0.09	0.24	1.26	0.23	0.11	0.24	0.01	0.02	0.17	0.07
1982	2.56	0.08	0.26	1.29	0.18	0.07	0.29	0.01	0.02	0.17	0.08
1987	2.55	0.07	0.21	1.14	0.19	0.12	0.29	0.01	0.02	0.20	0.18

* Less than 0.01 credits.

males and females, SLMP credits consistently increased between 1969 and 1982. Between 1982 and 1987, however, enrollments for males dropped slightly while they remained steady for females.

In three occupationally specific programs—business management, marketing and distribution, and technical and communications—the differences in the average number of credits earned by males and females were quite small. During all of the years shown in Table V.2, the difference in the number of credits completed by males and females was 0.1 credits or less. In 1979-82, for instance, females completed 0.23 credits in marketing and distribution and .24 credits in business management, while males completed 0.17 credits in the former and 0.18 credits in the latter subject. Figure V.1 indicates that the proportion of males and females who enrolled in business management, marketing, and technical and communications were also similar. In 1987, for example, 19 percent of the males and 23 percent of the females completed some coursework in business management.

Table V.2 indicates that from 1969 to 1987 there have been few changes in the enrollment disparities between males and females in vocational fields that have stereotypically been identified as male occupations: agriculture, construction, mechanics and repairs, and precision production. For the entire period shown, females obtained substantially fewer credits in agriculture than males. Additionally, there was very little change in the number of credits earned by females (Figure V.2). In 1969 females earned 0.02 credits in agriculture, and from 1975-78 through 1987 they earned just under 0.10 credits. In contrast, males have had relatively higher rates of participation in agriculture. In 1969 males completed 0.12 credits in agriculture. By 1975-78 they earned an average of 0.26 credits; in 1979-82, 0.35 credits.[38]

Similar patterns existed in construction and mechanics and repairs. Females were virtually unrepresented in both the fraction of students enrolled and the number of credits completed (Figure V.2 and Table V.2). In contrast, males had relatively high rates of participation. In 1982, for example, 14 percent of the males were enrolled in construction courses and completed an overall average of 0.27 credits. During the same year, just 1 percent of the females were enrolled in construction courses and completed an overall average of 0.01 credits.

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[38] Our own research using High School and Beyond showed that when enrollments within subject areas (i.e., agriculture, business support, etc.) are examined, course enrollments for females and males are even more stratified than shown in the aggregate. For example, within agriculture, credits earned by females were largely concentrated in horticulture or agricultural sciences. In her research, Vetter found similar patterns. Louise Vetter, Stability and Change in Enrollment of Girls and Young Women in Vocational Education: 1971-1980.

Figure V.1
Percentage of Male and Female High School Graduates Who Enrolled in Business Management, Marketing, and Technical and Communications Courses (1969-1987)

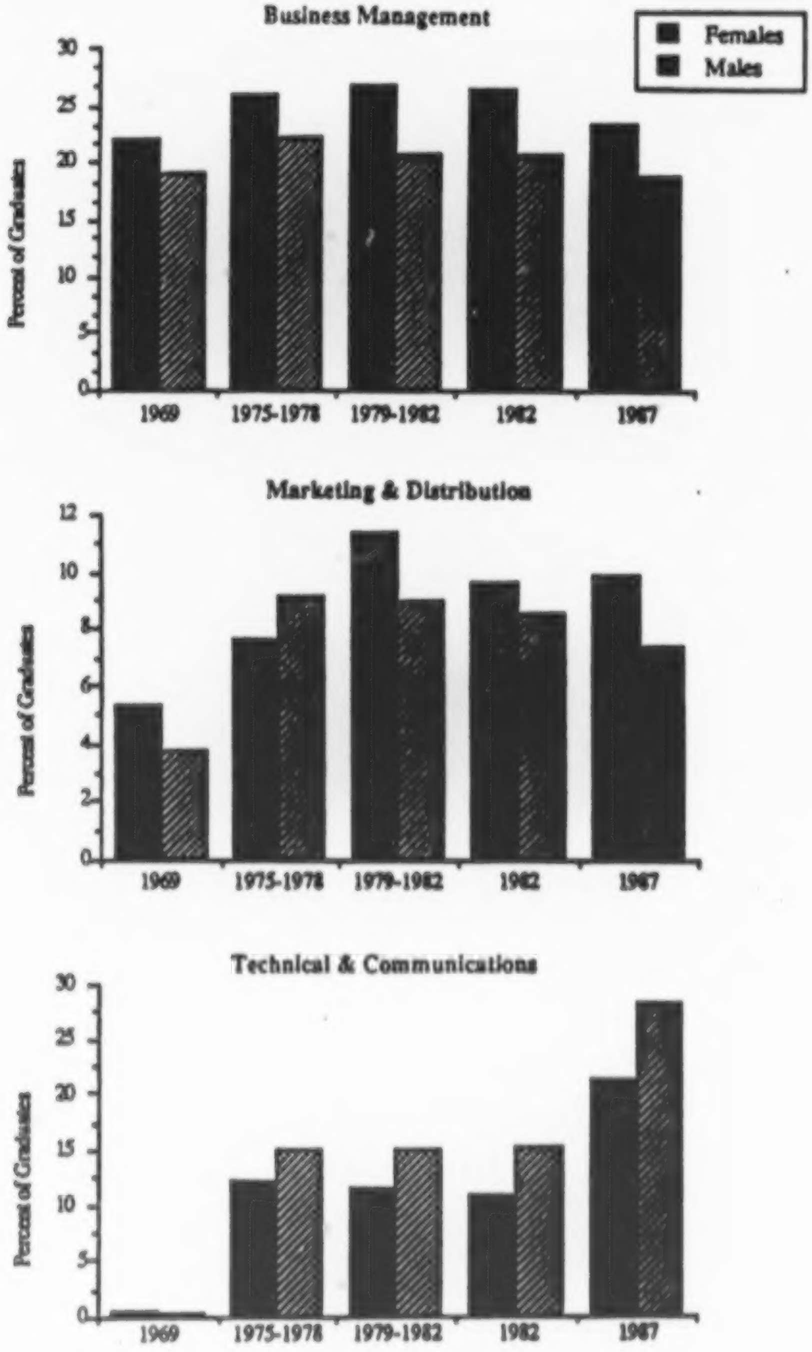
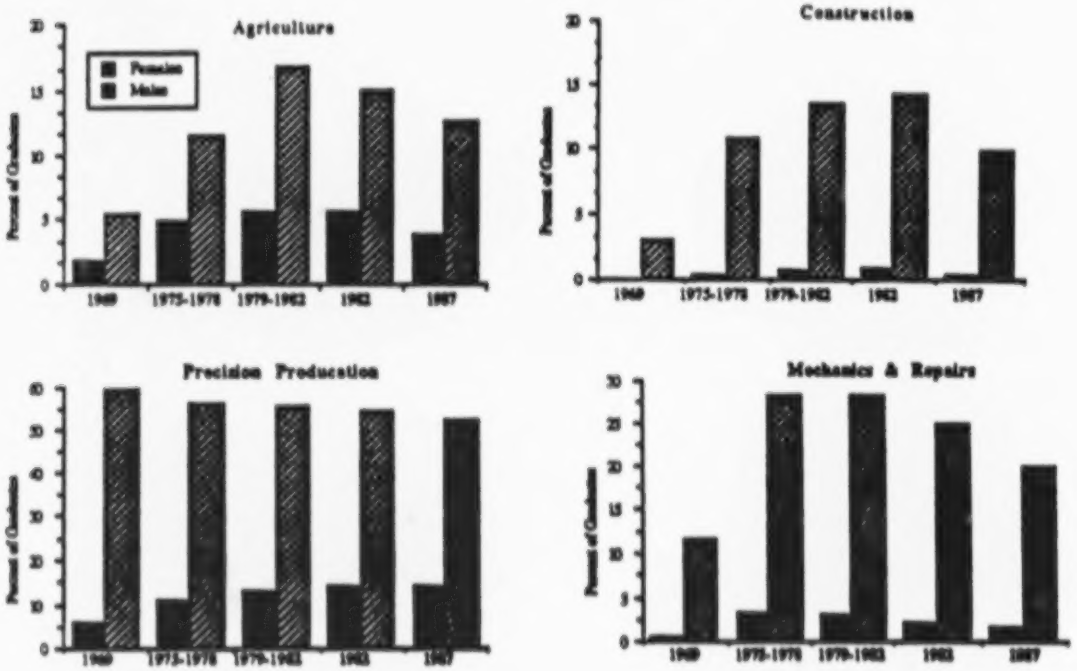


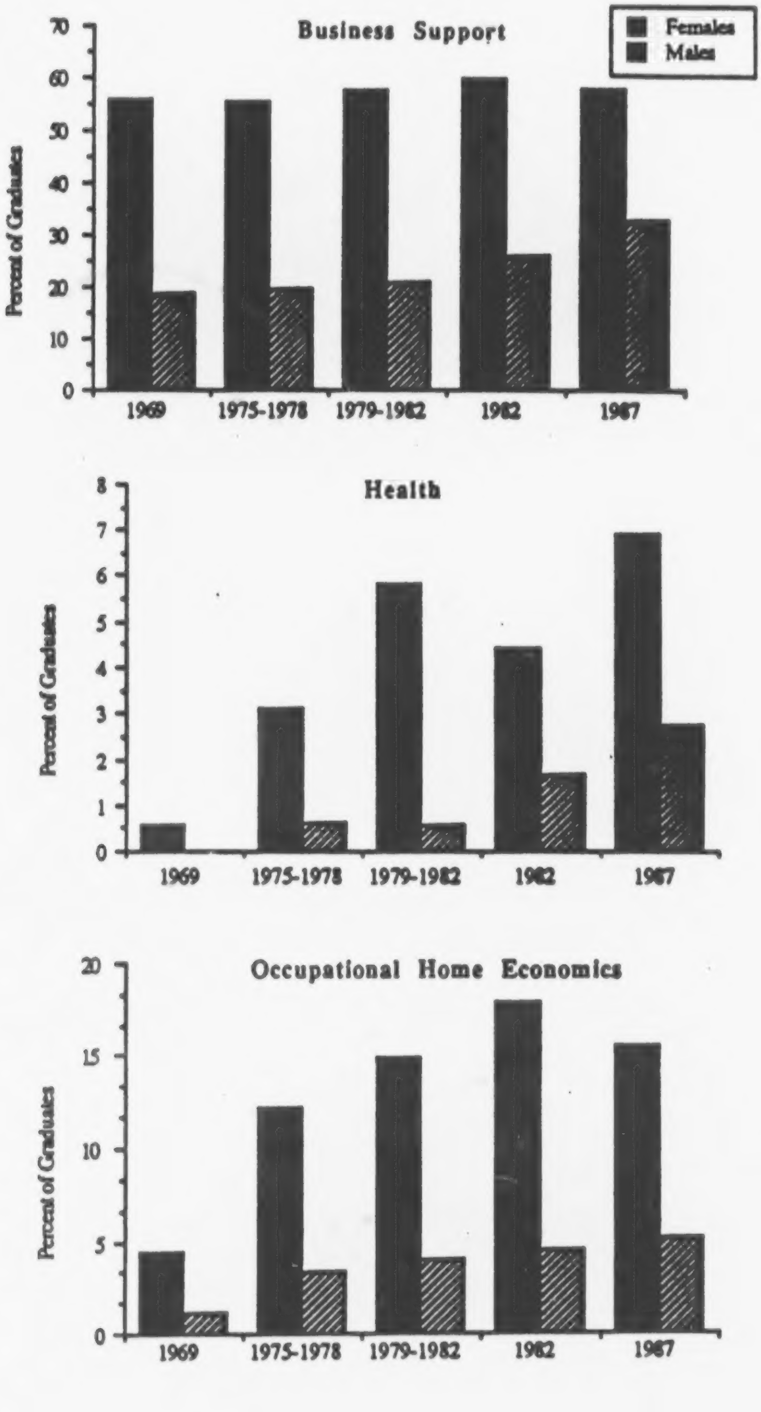
Figure V.2
Percentage of Male and Female High School Graduates Who Enrolled in Agriculture, Construction, and Mechanics & Repairs Courses (1969-1987)



The patterns for precision production courses were somewhat different. Unlike the other traditionally male-oriented vocational fields, there were some small increases in the fraction of females enrolled. In 1969, 6 percent of the females completed some coursework in precision production. By 1975-78 this fraction increased to 11 percent; in 1979-82, to 13 percent; and in the two most recent periods shown, 14 percent. The number of credits also rose a small amount, from 0.12 credits in 1969 to 0.20 credits in 1987.

Many of the occupationally specific programs that have traditionally been considered "female oriented" were still dominated by females in 1987. In business support, health, and occupational home economics courses, the proportion of females enrolled was significantly higher than the proportion of males in the same areas (Figure V.3). Accordingly, there were also significant differences in the average number of credits completed by males and females in traditionally female vocational subjects.

Figure V.3
Percentage of Male and Female High School Graduates Who Enrolled in Business Support, Health, and Occupational Home Economics Courses (1969-1987)



Although there continued to be disparities between the SLMP enrollments of males and females, there has been some progress towards sex equity in traditionally female areas, particularly in business support. Between 1969 and 1987 there was very little change in the fraction of females participating in business support classes. During this same period, however, male participation in business support courses grew significantly. In 1969 just under 20 percent of the male graduates enrolled in business support courses; by 1987 the proportion of males in business support courses had increased to one-third. The number of credits earned by males in business support also increased over the period shown in Table V.2. Males earned an average of 0.22 credits in support classes in 1969, 1975-78, and 1979-82; in 1982 the average increased to 0.29 credits; and in 1987, to 0.41 credits.

Participation by males in occupational home economics (OHE) and health have increased over the time frame studied here (Figure V.3). In OHE, for instance, the fraction of males enrolled grew from 1 percent (in 1969) to 5 percent (in 1987). During this same period, however, the rates of participation for females also grew from 4 percent to 16 percent. Consequently, the differences between males and females still existed in 1987. This pattern was also true in the health curriculum. The same patterns that emerged in the fraction of males and females enrolled in traditionally female-oriented occupations also persisted in the number of credits earned in these fields. In all of the years shown in Table V.2, males completed 0.02 credits or less in health. In contrast, female enrollment in health courses ranged from 0.01 to 0.12 credits.

Access to Vocational Education for Disadvantaged Students

Federal vocational policy, as defined by the Perkins Act, seeks to improve access to vocational education for economically and/or educationally disadvantaged students. This section examines trends in secondary vocational enrollments for students who were disadvantaged. Two measures are used to identify disadvantaged students. There were no consistent measures of family income in the transcript data sources used in this analysis. Since there is a strong positive association between education and income, father's education will serve as an indicator of economic status.[39] Although it may not be true in every instance, generally students whose fathers had less education probably had lower family incomes than students whose fathers completed more education. High school grades will be used to identify students who may have been academically disadvantaged. The two indicators are highly correlated and, to some extent, describe the same subpopulation of high school graduates. Among those in the class of 1982, for example, 45 percent of the students whose parents never completed high school had grade averages of C or below.[40]

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[39] An earlier report for the National Center for Education Statistics demonstrated a relationship between father's education and characteristics often associated with socioeconomic status. The same report also showed that students with fathers who had higher levels of education were more likely to enter postsecondary education and complete a four-year degree. See Eva Eagle, *Socioeconomic Status and Home Environment: The Correlates of Student Achievement*, a report prepared for the National Center for Education Statistics, MPR Associates, Inc., Berkeley, May 1988.

Vocational Education Course-Taking Patterns for Graduates by Father's Education

Table V.3 presents information about vocational course taking patterns among students according to the highest level of education completed by their fathers. The table indicates that those students who were economically disadvantaged participated in the vocational curriculum at equal or greater rates than those who were not economically disadvantaged. In 1969, for example, those whose fathers completed a high school diploma or less were more likely to have completed at least one vocational education course than those students whose fathers completed any postsecondary education. Ninety-six percent of the students from families where the fathers did not complete high school enrolled in vocational education. In contrast, only 86 percent of the students from families where the fathers completed an advanced degree enrolled in vocational education. For the classes of 1975-78 and 1979-82, those who had fathers with no postsecondary education were just as likely to have completed some vocational coursework as those with fathers who had some college. In addition, students in the former group were more likely than students whose fathers completed four or more years of college to have enrolled in vocational education. Although participation in vocational education has grown, in 1982, the last year shown in Table V.3, students whose fathers completed four or more years of college were still less apt to have enrolled in vocational classes.

Table V.3 shows that there was a consistently strong relationship between father's education and vocational credits. Those students with fathers who had completed less education earned more vocational education credits then their peers whose fathers had completed relatively more education. For example, students in the class of 1982 whose fathers did not finish high school earned, on average, 5.49 credits in vocational education; those whose fathers received a high school diploma earned an average of 5.05 credits; students with fathers with some college, 4.09 credits; those with fathers who received BAs, 3.05 credits; and those with fathers who received advanced degrees completed an average of 2.90 credits.

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[40] C. Dennis Carroll and Carlyle E. Maw, *High School and Beyond: Crosstabulations of Classification Categories for High School Sophomores*, National Center for Education Statistics, U.S. Department of Education, January 1986, Table 22b.

Table V.3
Percentage of Graduates with Vocational Education Credits and the Average Number of Credits Completed in Vocational Education by Father's Education
(1969-1982)

	Percent with Voc Ed	Average Number of Credits			
		All Voc Ed	CHE	All GLMP	All SLMP
1969					
LT High Schl	95.7	4.54	0.70	1.18	2.66
HS Only	94.0	3.76	0.44	1.02	2.30
Some College	87.7	2.78	0.37	0.99	1.41
4 Yrs College	81.2	2.03	0.25	0.72	1.06
Adv Degree	85.7	2.57	0.46	0.85	1.26
1975-1978					
LT High Schl	98.5	5.46	0.92	1.35	3.19
HS Only	99.5	5.03	0.65	1.45	2.92
Some College	95.0	3.85	0.46	1.07	2.33
4 Yrs College	93.3	2.99	0.46	1.02	1.51
Adv Degree	88.3	2.46	0.44	0.80	1.22
1979-1982					
LT High Schl	98.5	5.67	0.80	1.46	3.41
HS Only	98.8	5.39	0.76	1.35	3.28
Some College	97.8	4.49	0.55	1.16	2.78
4 Yrs College	94.4	3.47	0.50	0.93	2.03
Adv Degree	93.2	2.75	0.41	0.89	1.45
1982					
LT High Schl	99.4	5.49	0.88	1.13	3.48
HS Only	98.3	5.05	0.74	1.03	3.27
Some College	97.4	4.09	0.56	0.97	2.56
4 Yrs College	95.3	3.05	0.41	0.82	1.82
Adv Degree	93.1	2.90	0.36	0.76	1.78

Within each year, there was little or no significant difference between students whose fathers completed four years of college and those students whose fathers completed advanced degrees.

The relationship between father's education and vocational education credits persisted when each of the three vocational curriculums were examined separately. In CHE, GLMP, and SLMP subjects, students whose fathers had completed less education earned more vocational credits than students whose fathers had relatively more education. In any given year, students whose fathers had completed four or more years of college completed 2.03 credits or less in the specific labor market curriculum. In contrast, the SLMP credits earned by students who had fathers with high school diplomas only ranged from 2.30 credits (in 1969) to 3.28 credits (in 1979-82).

Vocational Education Course-Taking Patterns for Graduates by Grade-Point Average

As depicted in Table V.4, students with lower grades were either equally or more likely to have enrolled in vocational courses than their peers with higher grades.[41] In 1969 students in each grade category were more likely than students with higher grades to have taken vocational education courses. For example, only three-quarters of the students with mostly A's completed at least one vocational course, compared to almost all of the students with mostly C's or below (97 and 100 percent respectively). Beginning with the class of 1975-78, participation in vocational education became more universal for all students, regardless of grades. That is, the participation rates for students with higher grades increased to levels similar to those of students with relatively lower grades. Although there were still some statistically significant differences between students with varying grade levels in 1982, for example, they were not practically different. Ninety-four percent of the students with the highest grades (mostly A's) enrolled in vocational education, compared to about 98 percent of those students with mostly B's, and 99 percent of the students who had lower grades (either mostly C's or below C).

Although there has been some change in the fraction of students with differing grades who participated in vocational education, credit patterns have remained consistent throughout the period shown in Table V.4. Generally, students with mostly C's or below completed more vocational credits than students in the two higher grade categories (mostly A's or mostly B's). Additionally, credit differences between students with mostly C's and below C were small and not statistically significant. During the most recent year shown, 1987, students in the two lowest grade categories completed close to 5 credits in vocational education. Graduates with mostly C's completed 5.00 credits while graduates with below C averages completed 5.08 credits. In contrast, students with mostly B's completed 4.12 credits, and students with mostly A's completed, on average, 2.94 credits.

There were some small, but statistically significant differences, in consumer and homemaking economics credits (CHE) for students with various high school grades. Overall,

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[41] Students with high school grade point averages of 3.30 or higher were placed in the mostly A's category. Those with grade point averages between 3.29 and 2.60 were placed into the mostly B's category; GPA's between 2.59 and 1.60 were included in the mostly C's category; and averages of 1.59 or below were put into the below C category.

Table V.4
Percentage of Graduates with Vocational Education Credits and the Average Number of Credits Completed in Vocational Education by High School Grades
(1969-1987)

	Percent with Voc Ed	Average Number of Credits			
		All Voc Ed	CHE	All GLMP	All SLMP
1969					
Mostly A	74.4	1.76	0.24	0.75	0.77
Mostly B	89.2	3.30	0.41	1.12	1.78
Mostly C	96.8	4.29	0.59	1.14	2.56
Below C	100.0	4.37	0.51	1.11	2.75
1975-1978					
Mostly A	93.3	3.40	0.55	1.04	1.81
Mostly B	96.4	4.44	0.69	1.38	2.38
Mostly C	98.6	5.04	0.72	1.32	2.99
Below C	96.4	5.33	0.32	1.33	3.68
1979-1982					
Mostly A	95.2	3.79	0.60	1.08	2.11
Mostly B	97.7	4.59	0.63	1.29	2.66
Mostly C	98.7	5.44	0.74	1.34	3.36
Below C	98.1	5.72	0.97	1.13	3.62
1982					
Mostly A	94.3	3.03	0.47	0.81	1.75
Mostly B	97.5	4.10	0.59	0.98	2.57
Mostly C	99.0	4.99	0.72	1.06	3.21
Below C	99.1	4.89	0.77	1.05	3.08
1987					
Mostly A	97.8	2.94	0.38	0.75	1.81
Mostly B	94.0	4.12	0.55	0.92	2.65
Mostly C	97.4	5.00	0.69	0.98	3.32
Below C	99.5	5.08	0.65	0.96	3.47

students with the highest grades (mostly A's) completed significantly fewer credits than their counterparts with lower grades. For example, in 1987, students with mostly C's or below earned about 0.7 credits in CHE courses (0.69 and 0.65 credits, respectively). Correspondingly, those with mostly B's earned, on average, 0.55 credits and those with mostly A's earned 0.38 credits.

As shown in Table V.4, students with mostly A's generally earned fewer credits in general labor market subjects than students who received lower grades. For example, in 1969 students with mostly A's completed 0.75 GLMP credits while other students completed roughly 1.10 credits. The apparent differences among, students with mostly B's, mostly C's, and below C's were small and were not statistically significant.

The largest differences among students with different grade point averages occurred in the specific labor market curriculum. Compared to students with higher grades, students with lower grades—mostly C's or below C—completed more credits, on average, in occupationally specific vocational courses. For example, in 1987, students who received mostly A's completed 1.81 credits in SLMP courses; students with mostly B's completed 2.65 credits; students with mostly C's completed 3.32 credits; and students with below C averages completed an average of 3.47 credits. Similar relationships between grades and vocational credits were found in the other years.

Access to Vocational Education for Handicapped Students

One of the objectives of the Perkins Act is to improve access to vocational education to handicapped students. This section uses the high school class of 1987 to compare participation in vocational education for high school graduates who have some type of handicap to the vocational education participation of all high school graduates. Two measures of participation are used here: the fraction of students with credits in various vocational subjects and the average number of credits earned. The results of this research indicate that at the secondary level, federal policy goals of fostering access to vocational education to handicapped students have, at some level, been addressed. Handicapped students were no less likely than their non-handicapped counterparts to have enrolled in high school vocational education. Furthermore, handicapped students took a significantly larger proportion of their high school credits in the vocational curriculum.

Table V.5 shows the average number of credits earned by all graduates and by those graduates who were handicapped. Compared to the overall population of 1987 high school graduates, graduates with some handicapping condition were just as likely as those without a handicapping condition to have enrolled in vocational education. Almost all of the handicapped students (99 percent) enrolled in at least one vocational education course, as did 98 percent of all graduates. In addition, handicapped students completed significantly more credits in vocational education than non-handicapped students. Graduates from public high schools earned, on average, 4.44 credits in vocational education; in comparison, handicapped students from comparable institutions earned, on average, 5.99 credits.

Table V.5
Percentage of Graduates Enrolled and the Average Number of Credits Earned in Different Parts of the Vocational Curriculum

	All Vocational Education	CHE	General Labor Market Prep Total	General Labor Market Prep Typing	General Labor Market Prep Intro Indus	General Labor Market Prep Career Exp	General Labor Market Prep GLM Skills	Specific Labor Market Prep Total	Specific Labor Market Prep 1st Crs Seq	Specific Labor Market Prep 2nd Crs Seq	Specific Labor Market Prep Specialty
	—Percentage of Graduates—										
All Graduates	97.8% 20.5%	47.2%	78.6%	65.6%	12.5%	14.2%	11.6%	88.5%	83.2%	42.9%	
Handicapped Graduates	99.2	53.7	73.5	34.8	22.7	37.2	10.0	90.3	86.9	39.3	19.8
	—Average Number of Credits—										
All Graduates	4.44	0.60	0.93	0.55	0.14	0.14	0.10	2.90	1.90	0.80	0.20
Handicapped Graduates	5.99	0.75	1.46	0.28	0.27	0.81	0.10	3.77	2.63	0.88	0.26

Source: NAEP Transcript Study, High School Class of 1987

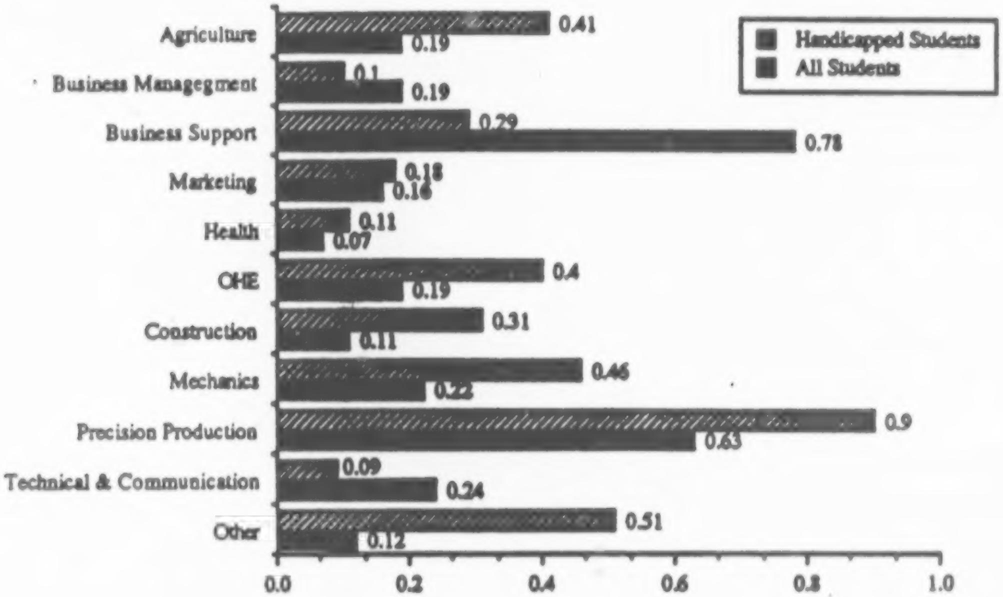
The same table also indicates the fraction of students who enrolled in the various parts of the vocational curriculum. Compared to all 1987 high school graduates, a slightly larger fraction of handicapped students enrolled in consumer and homemaking economics courses (CHE). Forty-seven percent of all graduates and 54 percent of all handicapped graduates had credits in CHE. Differences in participation levels of handicapped and all students were reflected in the average number of credits earned (0.75 and 0.60 credits, respectively).

Handicapped students were somewhat less likely than all students to have taken a general labor market preparation courses (74 percent to 79 compared). Although handicapped students generally participated in GLMP at higher rates than all graduates, this finding was not uniform throughout the general labor preparation curriculum. Handicapped students were far less likely than non-handicapped students to have enrolled in typing courses. Conversely, handicapped students were more apt to have enrolled in introductory industrial arts or career exploration classes. Finally, there were no significant differences between enrollments in general labor market skill courses for handicapped and non-handicapped students.

Handicapped students were just as likely as the overall sample of students to have enrolled in a occupationally specific vocational course. Ninety percent of the handicapped students participated in the SLMP curriculum compared to 89 percent of all graduates. Although handicapped students were no more likely to have participated in SLMP vocational education, on average, they earned significantly more credits in the occupationally specific curriculum. Handicapped students earned 3.77 credits in SLMP courses while all students earned, on average, 2.90 credits. This difference was largely due to differences in the number of introductory SLMP credits taken. While the average number of first course SLMP credits earned by all students was 1.90, handicapped students completed, on average, 2.63 credits.

Figure V.4 shows the average number of credits earned by all students and by handicapped students in each of the different SLMP subjects. In most subject areas there were significant differences between the average number of credits earned by handicapped and non-handicapped students. Non-handicapped students earned significantly more credits in business courses than handicapped students. For example, the average number of credits earned in business support was 0.78 credits for all graduates. For handicapped graduates, however, the average was only 0.29 credits. In contrast, handicapped students earned, on average, significantly more credits in trades and industry (construction, mechanics, and precision production). Handicapped students earned, on average, 1.68 credits in T&I fields while the

Figure V.4
Average Number of Credits Earned in Different SLMP Subjects by All High School Graduates and by Handicapped High School Graduates



overall average for all graduates was 0.96 credits. Additionally, handicapped students earned more credits, on average, in agriculture, and occupational home economics, and unspecified SLMP courses. There were no significant differences between the average number of credits earned by handicapped and non-handicapped students in either health or marketing and distribution courses.

Summary of Findings

This chapter has examined course-taking patterns for three special needs populations: handicapped students, academically and/or economically disadvantaged students, and students seeking training in non-traditional occupations. If the number of credits earned indicates access at the secondary level, then the results of this study are promising. This chapter shows that students who were academically or economically disadvantaged enrolled in vocational education at rates equal to or greater than the overall student population. Compared to non-disadvantaged students, disadvantaged students completed a larger portion of their high school coursework in the vocational curriculum. Similarly, handicapped students completed a proportionately larger fraction of their coursework in vocational education then non-handicapped students. The findings on enrollments for males and females in non-traditional occupations are less positive. By 1987 males and females participated at the same rates in business management, marketing, and distribution, and technical and communications courses. However, males continued to dominate in fields considered traditionally male. Females earned almost no credits in either construction, mechanics, or agriculture. Similarly, males were still underrepresented in vocational fields considered traditionally female.

APPENDIX

TECHNICAL APPENDIX

This technical appendix describes the procedures used to specify the sample of students described in the tables, the procedures developed to make the samples consistent, and the weights that were used to ensure that the data were nationally representative. In addition, this appendix briefly discusses the Secondary School Taxonomy (SST) used for categorizing the transcript information, and identifies inconsistencies between the different data sets with respect to the categorization scheme.

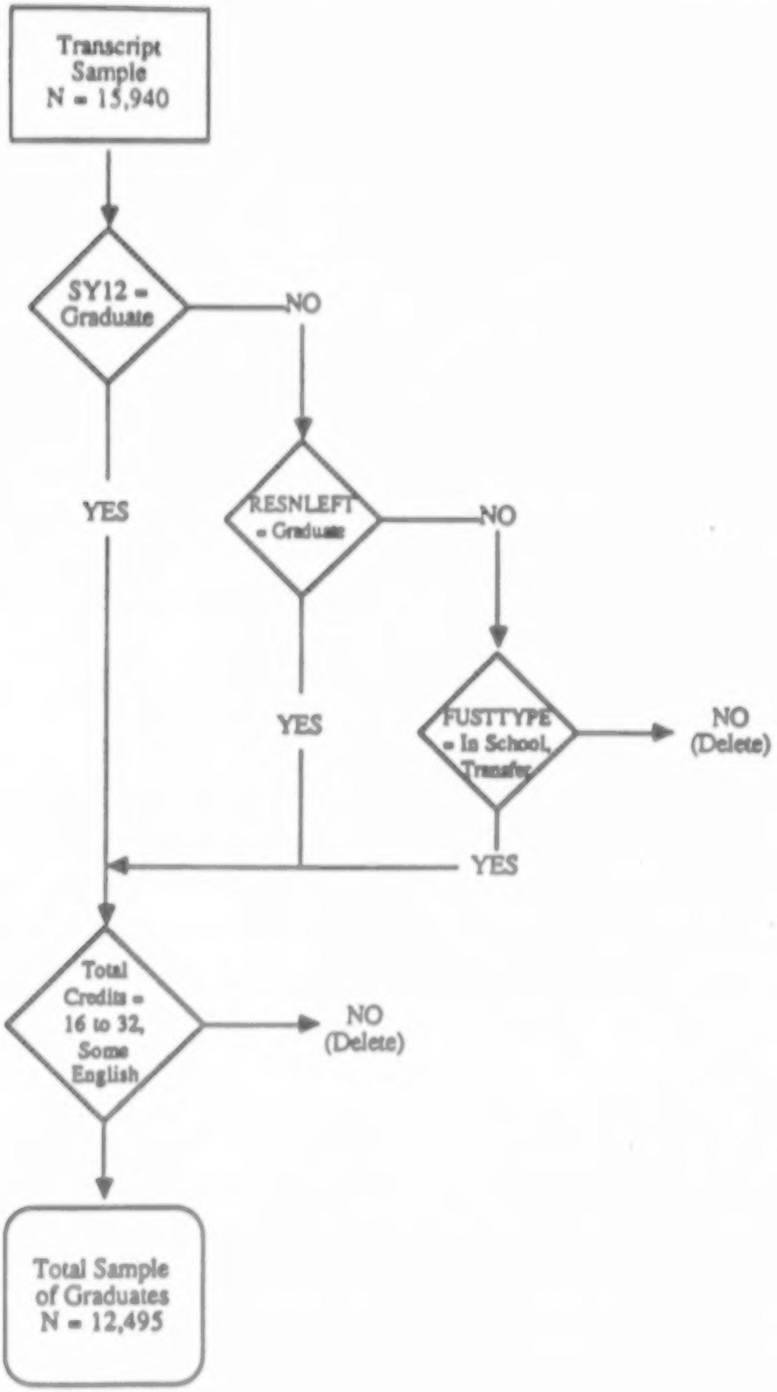
1. Sample Selection Rules and Reweighting Procedures

This section describes the sample selection rules and, where appropriate, the reweighting procedures used to ensure that the data are representative of high school graduates. Each data set is described separately. However, three general rules were applied to each sample of students: 1) only high school graduates were included in the analysis sample; 2) all graduates had to have completed between 16 and 32 Carnegie Units (credits) in high school; and 3) all graduates had to have completed at least some English over their four years in high school.

High School and Beyond

The sample used in the High School and Beyond tables was drawn from the HS&B Sophomore transcript file. This file contains 15,940 cases, of which 12,495 are graduates. In order to identify high school graduates in the transcript file, we developed a "student type" variable. This variable is a composite of graduation status varibles obtained from the first follow-up survey (FUSTTYPE), the transcript survey (RESNLEFT), and the second follow-up survey (SY12). Students were classified as graduates sequentially based on their classifications by these three variables. In cases where the three variables agreed with respect to the student's graduation status, the student was classified accordingly. Where there was disagreement among these variables, preference was given to second follow-up data (SY12) because of its later date of collection and greater specificity. If this variable was missing, preference was then given to transcript survey data (RESNLEFT); only when the student's graduation status was ambiguous or missing from both of these surveys was the first follow-up variable (FUSTTYPE) used to classify the case. Figure 1.1 illustrates the decision rules used to identify high school graduates. The final Student Type (STDTYPE) variable contained

Figure I.1
Sample Selection Rules for the High School and Beyond Transcript Sample


Transcript Sample N = 15,940
SY12 = Graduate
NO
YES
RESNLEFT = Graduate
NO
YES
FUSTTYPE = In School, Transfer
NO (Delete)
YES
Total Credits = 16 to 32, Some English
NO (Delete)
Total Sample of Graduates N = 12,495

eight categories: 1) early graduate, 2) regular graduate, 3) late graduate, 4) still working, 5) drop out, 6) GED/night school, 7) unknown—in school as of the first follow-up, and 8) unknown—transfer at the time of the first follow-up. Only students classified in STDTYPE categories 1, 2, 3, 7, and 8 were considered eligible for inclusion in the sample of graduates.

Two supplemental criteria were used to specify the sample for the High School and Beyond tables. First, in order to protect the integrity of the estimates of high school course-taking patterns, we limited our sample to those cases who had completed between 16 and 32 credits in high school. Second, students must have earned more than zero credits in English to be included in the sample. The credit requirement eliminated 942 cases from the sample, and the English limitation resulted in another 19 cases being excluded from the sample. Table 1.1 shows the distribution of cases by the Student Type variable and supplemental criteria.

TABLE I.1
DISTRIBUTION OF CASES BY STUDENT TYPE

	Student Type Categories								
	Early Grad	Reg. Grad	Late Grad	Still Working	Drop Out	GED/ Night	Unknown In School	Unknown Transfer	TOTAL
In Range	414	11651	412	*	*	*	0	18	12495
Out of Range/ No English	86	540	297	*	*	*	0	38	961
Not Graduates	*	*	*	248	1752	484	*	*	2484
TOTAL	500	12191	709	248	1752	484	0	56	15940

* Not applicable.

The sample was weighted using the transcript weight (TRWT), a variable included in the transcript file. This weight corrects for both differential selection probabilities in the transcript sample resulting from over-sampling of certain populations, and also for non-response to the transcript survey.

National Longitudinal Survey—Youth Cohort

NLS Youth presented somewhat different problems than HS&B because of the way in which the transcript sample was constructed. The transcript sample in NLS Youth contains

9,010 cases and was based on the 1979 base year survey sample of 14 to 24 year olds, which contains a total of 12,686 cases. Unlike the transcript portion of HS&B, however, the NLS Youth transcript sample was not representative of the population of 14 to 24 year olds since transcripts were only collected from respondents who agreed to supply them; no effort was made to correct for non-response bias in the transcript study. In addition, students in the NLS Youth sample had dates of graduation ranging from 1971 to 1984, although the number of cases graduating in years prior to 1975 and after 1982 was very small. For purposes of the time series analysis, we restricted our inquiry to the years 1975 through 1982.

To reduce the potential bias introduced into the transcript sample due to non-response, we developed the following procedure to reweight the sample of graduates. The first step in reweighting the sample was to identify the total population of graduates in the NLS Youth cohort. Transcripts were not supplied uniformly by the members of the different weighting strata, so we could not assume that the distribution of graduates in the transcript sample was the same as in the total cohort. In fact, non-graduates were less likely to have supplied transcripts. Since certain strata were more likely to be non-graduates, reweighting the transcript sample to reflect the population of the total cohort would have resulted in over-estimating the number of graduates from those strata that had disproportionately lower graduation rates and lower rates of participation in the transcript study. By limiting our reweighting scheme to high school graduates, we were able to control for differential rates of graduation by strata and for differential rates of participation in the transcript survey.

In addition to non-graduates being less likely to supply transcripts, students who graduated in the years 1975 to 1978 or in 1982 were less likely to have supplied transcripts than students who graduated in the years 1979 to 1981. Therefore our reweighting scheme was specified separately for each graduating class. This controlled for the differential rates of participation in the transcript sample by year of graduation, so graduates with transcripts were only reweighted to reflect their own graduating class.

In order to derive a weighted estimate of the total number of graduates in the NLS-Youth cohort, two sets of variables—one drawn from self-report data and the other from the transcript data—were used to identify high school graduates. The transcript sample contained two variables that could be used to specify students' graduation status: "Reason Left School" and "Last Year Attended This School." The NLS Youth questionnaires also contained variables indicating whether students were graduates and their year of graduation. Each set of variables thus allowed independent identification of high school graduates. The fit between these two sets of variables was very good, but there were some discrepancies. The algorithm for identifying the total number of graduates in the NLSY cohort took these discrepancies into consideration.

The algorithm defined the total sample of graduates in the NLS Youth cohort as the sum of 1) all graduates identified by the annual questionnaire items who did not have transcripts, 2) all students who were identified as graduates in the transcript sample, and 3) all students who were classified as missing or as transfers in the transcript sample, who were identified as graduates in the questionnaire items, and who had completed between 16 and 32 credits.[1] These rules resulted in a total sample of 8,308 graduates. The weights for these students were then summed within strata for each year of graduation using the 1979 questionnaire weight to arrive at an estimate of the total number of graduates in the 14 to 24 year old cohort. Figure 1.2 shows the selection rules for this cohort sample of graduates graphically.

The sample of graduates for the time series study was a subset of students for whom transcripts were available. Students were included in the transcript sample if 1) they were classified by the Reason Left variable as being high school graduates, or 2) they were classified by the Reason Left variable as transfers or their graduation status was missing, and they were identified as graduates in the questionnaire items. In all cases students had to have completed between 16 and 32 credits, and must have completed more than zero English credits. Figure 1.3 shows this selection process. The total sample of students meeting these criteria contained 5,676 cases. We then summed the weights of these students within strata for each year of graduation, and then inflated these weights to approximate the sum of weights for the sample of graduates in the total NLS Youth sample.

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[1] These are relatively conservative decision rules. If a student was identified as a graduate in the self-report items and we had no transcript information about that student, we accepted the self-report. However, where the transcript disagreed with the self-report items, we relied on the transcripts. Only where the transcript description was imprecise (missing or transfer) did we supplement transcript information with the self-report information and the credit rules.

Figure I.2
Selection Rules For the Total NLS Youth Cohort Sample of Graduates

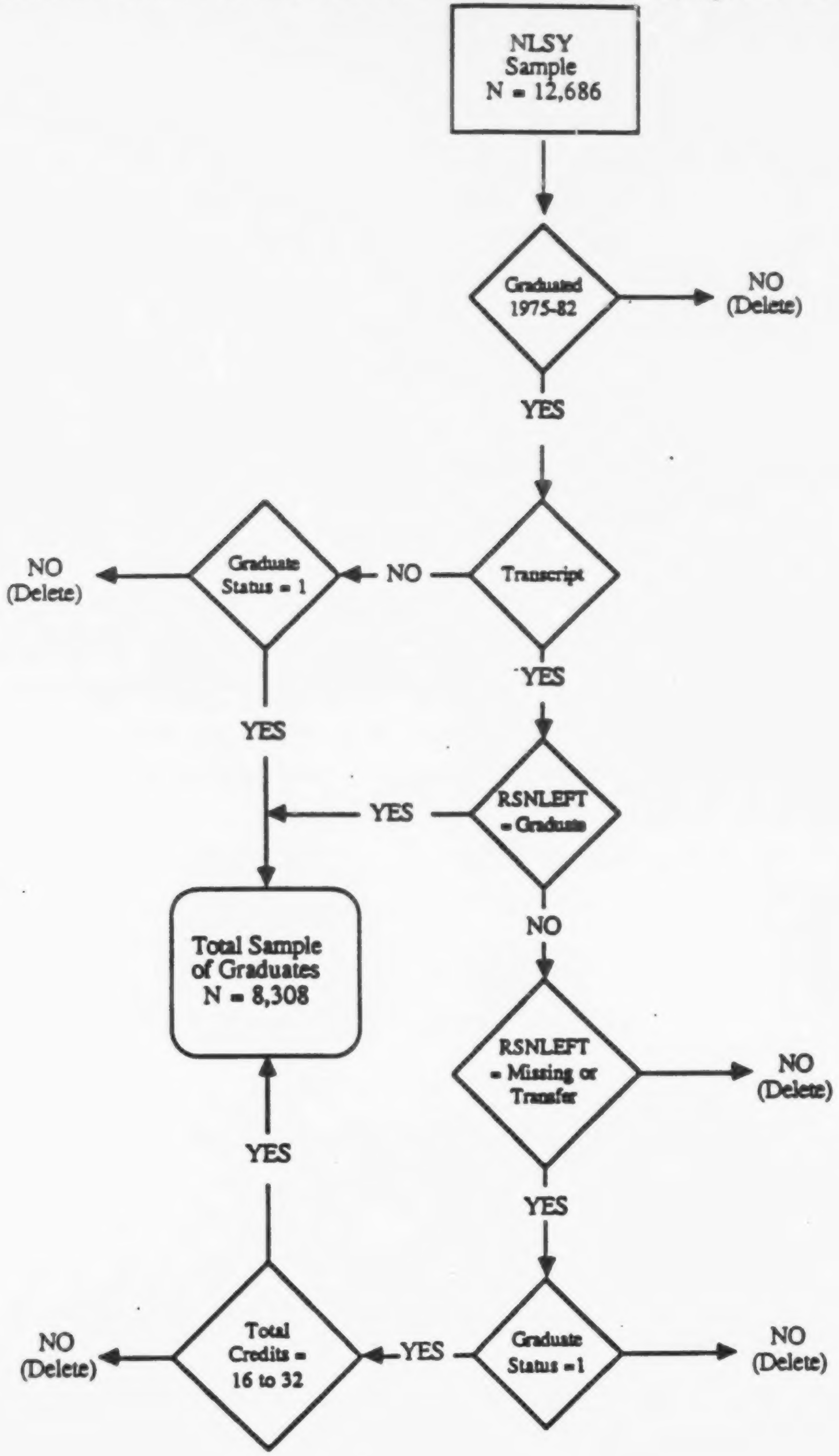


TABLE I.2
DISTRIBUTION OF CASES BY REASON LEFT, 1975 TO 1982

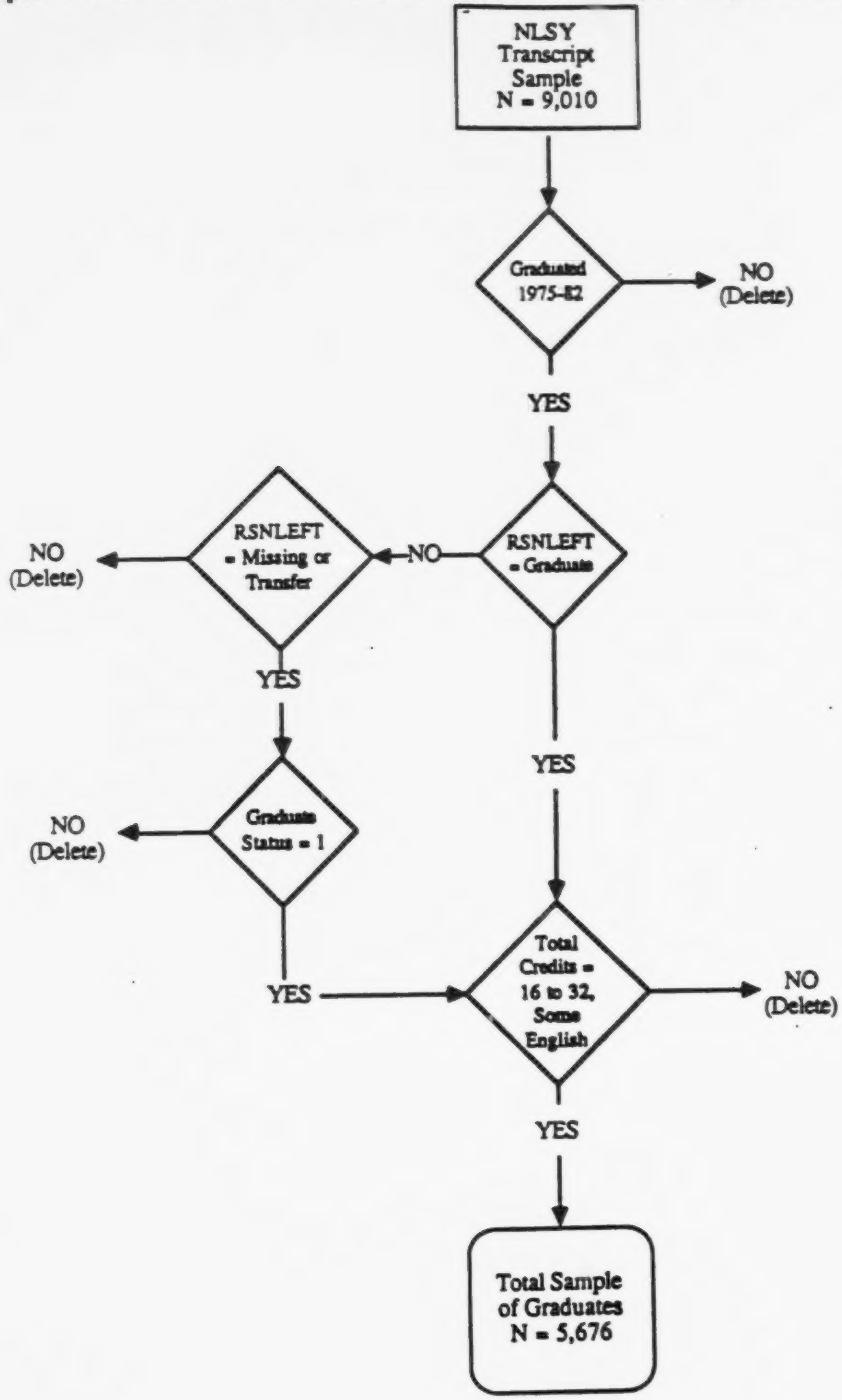
	Reason Left Categories							
	Unknown	Grads	Transfers	Expelled	Dropout	Other	GED	TOTAL
In Range	196	5,438	42	*	*	*	*	5,676
Out of Range/ No English	29	774	114	*	*	*	*	917
Not Graduates	*	*	*	9	1,012	198	444	1,663
TOTAL	225	6,212	156	9	1,012	198	444	8,256

* Not Applicable.

ETS Study of Academic Prediction and Growth

The ETS transcript study contained only graduates, so identification of the sample of high school graduates was not a problem. However, unlike HS&B and NLS Youth, the ETS study was not a stratified sample designed to be representative of the population. Rather, the sample included data on students from 24 schools in 17 communities, which were selected to vary by geographic location, school system size, and the proportion of students continuing on to higher education. Also unlike HS&B and NLS Youth, only public school students are represented.

Figure I.3
Sample Selection Rules For the NLS Youth Transcript Sample of Graduates


NLSY Transcript Sample N = 9,010
Graduated 1975-82
NO (Delete)
YES
RSNLEFT = Graduate
NO
RSNLEFT = Missing or Transfer
NO (Delete)
YES
Graduate Status = 1
NO (Delete)
YES
YES
Total Credits = 16 to 32, Some English
NO (Delete)
YES
Total Sample of Graduates N = 5,676

Despite weaknesses in the sample design, subsequent work with the ETS data has shown it to be approximately representative of the population of high school graduates in 1969.[2] However, none of the largest metropolitan areas of the country are represented. In addition, because of problems with incomplete transcripts, the South is underrepresented in the transcript sample.

The total sample of students with transcripts contains 6,117 cases. We limited the sample for the time series analysis to those students who had completed between 16 and 32 credits and at least one course in English in high school, a total of 5,637 cases.

The ETS sample contained no weights that could be used for approximating the total population of graduates in 1969. However, we reweighted the sample by strata constructed of race/ethnicity and sex to correct for the attrition caused by limiting the sample to those with 16 to 32 total credits and some amount of English. Although the final sample is not more representative than original transcript sample, the biases are known and can therefore be taken into consideration in interpretation of the data. Furthermore, by correcting for incomplete transcripts, we hope to correct for some of the regional bias in the data. We are reasonably confident that the total credits and credit breakdowns by curricular areas are good approximations of the actual course-taking patterns for all students and for students by sex.

In order to generate estimates of the total population of public high school graduates in 1969, we relied on data published by the Center for Education Statistics.[3] We then used the estimates of the proportions of students with various patterns of curricular participation to estimate the number of students enrolled and the total number of course credits completed.

National Assessment of Educational Progress

The National Assessment of Educational Progress (NAEP) high school transcript data file contains 34,140 cases, of which 26,473 are high school graduates. The sampling frame for this data set was all high school students who were juniors in 1986; hence, the sample includes those students who graduated as part of the high school class of 1987.

Like the HS&B sample, NAEP is a highly stratified, clustered sample that can be used to derive national estimates of the course taking patterns of high school students. However, unlike HS&B, NLSY, and ETS, the NAEP sample explicitly included students with physical, emotional, and/or mental disabilities. These students were not necessarily excluded from the from the other samples, but no special effort was made to ensure that they were included. In addition, special education courses were explicitly designated as such in the NAEP transcript file; to make the NAEP course taxonomy consistent with those of the other data sets, special education courses were integrated into the taxonomy of courses as if they were non-special education courses.[4] These were important differences in the samples, and thus entailed special procedures to make the NAEP sample consistent with the samples in other three data sets.

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[2] See Thomas L. Hilton, "ETS Study of Academic Growth and Prediction," *New Directions for Testing and Measurement*, Vol. 2 (1979), 29.
[3] Martin M. Frankel, and Debra E. Gerald, *Projections of Education Statistics to 1988-1989*, National Center

The first step in specifying the NAEP transcript analysis sample was to restrict it to high school graduates only. The variable "Student Exit Status" (EXSTAT) was used to distinguish between graduates and non-graduates. Students classified as regular (code 1) or honors (code 2) graduates, and students whose exit status was classified as "Other" (code 7) were eligible for inclusion in the sample of graduates. The sample was then limited to those graduates who had completed between 16 and 32 credits and who showed positive English credits, as we had done with the other data sets. Students from the "Other" category were included so that transfers and other graduates (such as late graduates) not explicitly identified as such would not be excluded from the sample. Students who were explicitly described as recipients of special education diplomas were excluded from the sample because they had no counterparts in the other data sets. Table 1.3 shows the distribution of cases in the transcript sample by their exit status, and Figure 1.4 graphically illustrates the decision rules used to limit the transcript sample to high school graduates.

TABLE I.3
DISTRIBUTION OF CASES BY STUDENT EXIT STATUS

	Student Exit Status Categories							
	Standard Diploma	Honors Diploma	Special Ed. Dipl.	Certificate	Still In	Dropout	Other	TOTAL
In Range	24,452	941	*	*	*	*	1,080	26,473
Out of Range/ No English	637	4	328	*	*	*	*	969
Not Graduates	*	*	*	182	2,502	2,109	1,905	6,698
TOTAL	25,089	945	328	182	2,502	2,109	2,985	34,140

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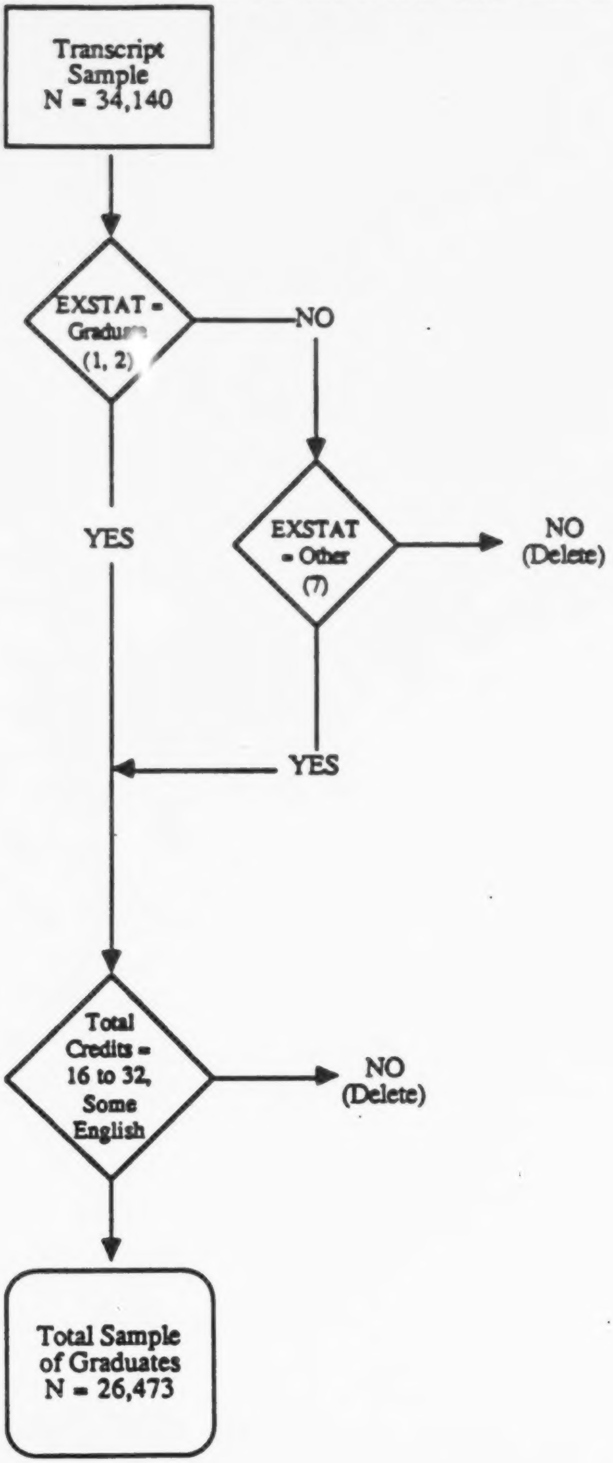
for Education Statistics, U.S. Department of Education (1980), 61.

[4] This strategy is consistent with the procedures used by NORC in coding the HS&B course data, and should therefore produce estimates that are consistent with HS&B. This procedure also explains the small number of credits completed in the special education curriculum.

Figure I.4
Sample Selection Rules for the NAEP Graduate Sample


Transcript Sample N = 34,140
EXSTAT = Graduate (1, 2)
NO
YES
EXSTAT = Other (7)
NO (Delete)
YES
Total Credits = 16 to 32, Some English
NO (Delete)
Total Sample of Graduates N = 26,473

The sample was weighted using the "Final Usable Transcript-Linked Student Weight" (FINSTUWT). This weight corrects for unequal probabilities of selection at the school and individual level, sample non-response, trimming factors, and post-stratification adjustments.

2. Constructed Classification Variables

Two row classification variables were constructed from transcript data for use in these tables: high school grade point average (HS GPA) and Grade Level (the year in which the credits were earned). Each course in the transcript files was stored with several pieces of information, including the course grade and the year in which the course was taken. Course grades were standardized on a four-point scale in which a 4.0 = A, 3.0 = B, 2.0 = C, 1.0 = D, and 0 is a failing grade. To construct HS GPA, we calculated each student's grade point average, and students were then categorized based on the following algorithm:

Mostly A = 3.3 ≤ GPA
Mostly B = 2.6 ≤ GPA ≤ 3.29
Mostly C = 1.6 ≤ GPA ≤ 2.59
Below C = GPA ≤ 1.59

The grade level variable was constructed from the taxonomy file, which was created to reflect courses taken in each year. Stored as part of the information available for each course was the grade in which the student took the course. This information was used to construct what were essentially separate taxonomies for each grade; these taxonomies could then be aggregated to reflect participation in the high school curriculum over all four years. The grade level variable, then, is really the total taxonomy for each year in which students were enrolled. However, to ensure that enrollment estimates were consistent from year to year, average credits were calculated by dividing total credits by the whole population of students represented in the sample, whether or not they had participated in each of the four years of high school.

3. Accuracy of Estimates

The statistics in this report are estimates derived from samples. Two broad categories of error occur in such estimates: sampling and nonsampling errors. Sampling errors happen because observations are made only on samples of students, not on entire populations. Nonsampling errors happen not only in surveys of sample groups but also in complete censuses of entire populations.

Nonsampling errors can be attributed to a number of sources: inability to obtain complete information about all students in all schools in the sample (some students or schools refused to participate, or students participated but answered only certain items); ambiguous definitions; differences in interpreting questions; inability or unwillingness to give correct information; mistakes in recording or coding data; and other errors of collecting, processing, sampling, and estimating missing data.

The accuracy of these estimates is determined by the effect of sampling and nonsampling errors. In surveys with sample sizes as large as those used here, sampling errors generally are not the primary concern, except where separate estimates are made for relatively small subpopulations such as Asian-Americans or Native Americans. Small sample sizes were not usually a problem in these tables, although some of the variables with numerous categories—such as race by sex, and the other multiple classification variables—could not be estimated in the year by year tables for NLSY.

The nonsampling errors are difficult to estimate. The major sources of nonsampling error considered were nonresponse bias and the reliability and validity of the data. The instrument response rates varied substantially by data set. In general, better data were available for factual items such as sex and race, while questions requiring the student to describe things like parents' income were less accurate. The weights used to calculate the estimates reported here were constructed to compensate for instrument nonresponse. None of the weighting schemes corrected for item non-response. Missing values for individual items were ignored, unless the problem was severe. Because of occasional missing items for a limited number of individuals, the unweighted n will not always sum to the total number of cases in the sample for some variables. In cases of severe item non-response, the item was not used.

Standard errors and unweighted Ns are not reported in this data handbook, although they were calculated as part of the tabulated data that went into these formatted tables. Standard errors could not be calculated using simple statistical procedures because of the complex designs of the data samples: standard routines would tend to underestimate the magnitude of the standard errors. A SAS routine called CDCTAB, developed by C. Dennis Carroll at the National Center for Education Statistics, which uses Taylor series approximation techniques, was used to estimate correct standard errors for these statistics.

4. Secondary School Taxonomy

The courses from each transcript data set were organized into the framework of the Secondary School Taxonomy (SST). This taxonomy was developed for organizing transcript data into four different curricula: academic, vocational, personal/other, and special education. To the extent possible, the level or difficulty of the course was specified in the taxonomic categories within each curriculum. For example, within the academic curriculum courses are categorized as basic, regular, advanced placement, or as specialized topics. This last category includes primarily more advanced courses within a designated subject area, but it also includes courses that could not be accurately identified as fitting into one of the other categories. In the vocational curriculum courses are designated as the first course in a sequence, second or higher course in a sequence, or as specialized topics. Any courses that could clearly be differentiated by their placement in a sequence were included in the specific sequence categories; again, the specialized topics category includes primarily courses that are advanced, but this category also includes courses whose levels could not be determined.

The SST was first developed using the High School and Beyond data set.[5] The HS&B course names and codes were highly differentiated, which enabled quite precise placement of courses in the taxonomy. However, this extensive differentiation was not consistent across all of the data sets. Several NLS-Youth course titles were often aggregated as a single course code; in several cases these course titles were distinguished separately in HS&B and were placed in different parts of the taxonomy. As a result, there were a number of inconsistencies in the time-series data that are not indicative of different patterns of course-taking, but are a function of inconsistencies in the way courses were coded in the original transcript data sets.

Table IV.1 shows that there were differences in the number of vocational course credits completed in 1982 when the estimates are made using HS&B or NLS-Youth. The NLS-Youth estimate shows that students took an average of 4.9 vocational credits, while HS&B shows that students completed an average of 4.4 vocational credits. At least half of this discrepancy is a function of the way in which courses were aggregated in the different data sets. Several courses that were differentiable in HS&B and placed in different curricula were originally coded as a single course number in NLS-Youth. That course fit best in the General Labor

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[5] The original SST was developed for the National Assessment by Cynthia L. Brown, E. Gareth Hoachlander, and Robert H. Meyer, with the assistance of National Assessment Staff, staff of the NAVE Support Center (VESAC), and an external review panel. Subsequent versions of the SST for the other data sets were developed by Antoinette Gifford, John Tuma, and Robert H. Meyer. These taxonomies will be published separately as a report of the National Assessment.

Market Preparation category.[6] However, this meant that credits earned in the personal/other curriculum in HS&B were shown as being earned in the vocational curriculum in NLS-Youth. The average number of credits earned in the personal/other curriculum was estimated to be 2.8 in HS&B and 2.6 in NLS-Youth. Since courses that were classified one way in HS&B had to be classified in another way in NLS-Youth because of the way they had been aggregated in the original data, credit discrepancies were largely a function of the way courses were classified.[7] This conclusion is supported by the fact that the total number of credits earned on average in both data sets for 1982 is the same, 21.6.

Table IV.1
Average Credits Completed in 1982 as Tabulated in HS&B and NLSY by Curriculum

	Total	Academic	Vocational	Personal/ Other
NLSY	21.6	14.1	4.9	2.6
HS&B	21.6	14.5	4.4	2.8

* The separate curricula may not sum to the total due to rounding.

One other course coding discrepancy was identified in courses within the science area of the academic curriculum. In HS&B, "Introduction to Physical Science" was classified as a Basic science course; in NLS-Youth, this course was aggregated with "Physics 1." Since Physics 1 was the primary course descriptor, it was classified as a physics course in NLS-Youth, even though the introductory course was included in this single course code. The result is that the estimate of credits completed in physics in NLS-Youth is considerably higher than the estimate in HS&B, 0.41 compared to 0.17. However, the total number of credits earned in science on average in 1982 was 2.3 in NLS-Youth and 2.2 in HS&B, suggesting that the misclassification of courses within the science curriculum accounts for the discrepancy in the physics area.

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[6] In HS&B, the following courses were included in the personal/other curriculum: CPR and First Aid, Citizenship/Civics, School Service, Assembly/Student Government, Tutoring, and Community Involvement. In NLS-Youth, the equivalents of these courses—Volunteer Work, Community Service, Teaching Assistant, and American Red Cross—were classified as one course number with Work Experience and On-the-Job Training, courses that are clearly related to work experience. Therefore the whole course number was classified as Work Experience/Career Exploration, even though some of the courses aggregated as part of this number were classified elsewhere in HS&B.

[7] We tried to use estimates of the course-taking activity in HS&B for the specific courses that we could identify as being mis-classified in NLS-Youth, and to then use these estimates to develop factors that could be used to adjust the number of credits earned in the different curricula. This effort proved to be exceptionally difficult, since a different factor was needed to adjust the estimates for each year in NLS-Youth, and ideally, a separate factor would be needed for each classification variable. The effort was abandoned when we realized that all of these factors would have to be extrapolated from one data year (1982), and that this extrapolation required assumptions about the distribution of cases within the sample that could not be sustained.

Such discrepancies were not a problem with the ETS, HS&B, and NAEP data sets. Like HS&B, the ETS transcript file did not aggregate courses within a single course number. The ETS file did not contain as many course titles as HS&B, but this could be a function of increasing differentiation within the high school curriculum over time. Furthermore, the two data sets are separated by so many years that it is difficult to draw any conclusions about discrepancies in the estimates of average course credits completed by students. The NAEP taxonomy of courses was developed from the same Classification of Secondary School Courses (CSSC) as the HS&B taxonomy. The NAEP taxonomy, however, contained even greater differentiation of courses than the HS&B taxonomy, particularly in the vocational subjects. In order to take advantage of this detail, we reclassified courses within subject areas to more accurately reflect differentiation between first and second or later courses in a sequence. In general, this meant reclassifying a course that was originally classified in the Specialty category of the vocational curriculum as courses in the First Course, and Second Course or Later categories. These differences therefore would not alter the relationship between curricula or between subject areas; they might, however, change the distribution of credits within a subject area.

OUTLINE OF THE SECONDARY SCHOOL TAXONOMY

I. ACADEMIC COURSES

Mathematics
- Basic
- General
- Applied
- Pre-Algebra
- Algebra I
- Geometry
- Advanced -- Other
- Advanced Calculus

Science
- Survey and Other Science
- Biological Science
- Chemistry
- Physics

English
- English Survey and Skills
- Language/Writing Skills
- Literature
- Composition and Writing
- Speech

Social Studies
- American History
- World History
- American Government and Politics
- Social Science, Humanities, and Other

Fine Arts
- Fine Arts and Crafts
- Music
- Dramatic Arts/Dance

Foreign Languages
- Survey and ESL
- Year 1
- Year 2
- Year 2 or Higher
- Year 3 or Higher

Foreign Languages by Language
- Spanish
- French
- German
- Latin
- Other (Including Survey)
- English as a Second Language

II. VOCATIONAL EDUCATION CURRICULUM

Consumer and Homemaking Economics

General Labor Market Preparation
- Typewriting I
- Introductory Industrial
- Work Experience /Career Exploration
- General Labor Market Skills

Specific Labor Market Preparation
- Agriculture and Renewable Resources
- Business Management
- Business Support
- Marketing and Distribution
- Health
- Occupational Home Economics
- Trade and Industrial
  - Construction Trades
  - Mechanics and Repairers
  - Precision Production
  - Transportation and Material Moving
- Technical and Communications
- Specific Labor Market, Unidentified Subject

III. PERSONAL/OTHER CURRICULUM

- General Skills
- Health, Physical and Recreation Education
- Religion and Theology
- Military Science

IV. SPECIAL EDUCATION

- Academic
- Vocational
- General

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- Business Support
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- Trade and Industrial
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